

Service Service Service

VR101/02/39/58

VR110/02/07/58

VR200A/02/07/39/58

VR210/02/07/39/58/60

VR215/02/07

VR217/02/07

VR260/02/07/39/58

VR400A/58

VR401/58

VR410/02/39/58

VR460/02/39/58

VR501/02/16/58

VR510/02/07/16/39/58

VR600A/02/07/16/39

VR605A/58

VR607A/02/07/16/39

VR610/02/07/16/39/60

VR617/02/07/16/58

SB130/03/38

SB135/03/07/11/16/38

SB435/11/38

SB535/38

SB635/03/11/16/38

SB735/03/11/38

20DV20/39

25DV20/39

45DV20/39

65DV20/39

AA

Service Manual

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Survey of remote controls:

VR101/02/58, VR110/02/07/58, **RT116/201** 8622 661 16201
 VR401/58, VR501/02/16/58,
 SB130/03, SB135/03/07/11/16,
 SB435/11, SB635/03/11/16,
 SB735/03/11

VR101/39, SB130/38, SB135/38, **RT116/204** 8622 661 16204
 SB435/38, SB535/38, SB635/38,
 SB735/38,
 20DV20/39, 25DV20/39, 45DV20/
 39, 65DV20/39

VR605A/58, VR607A/02/07/16, **RT114/101** 8622 661 14101
 VR617/02/07/16/58

VR607A/39 **RT114/104** 8622 661 14104

VR217/02/07, VR260/02/07/58, **RT113/101** 8622 661 13101
 VR460/02/58, VR600A/02/07/16,
 VR610/02/07/16

VR260/39, VR460/39, VR600A/39, **RT113/104** 8622 661 13104
 VR610/39/60

VR200A/02/07/58, VR21002/07/58, **RT112/101** 8622 661 12101
 VR215/02/07, VR400A/58,
 VR41002/58, VR510/02/07/16/58

VR200A/39, VR210/39/60, **RT112/104** 8622 661 12104
 VR41039, VR510/39

Survey of versions:

/02/03	PAL B/G, VPS/PDC
/05	PAL I, UK
/07	PAL I, Ireland
/11	PAL B/G, Belgium
/13	PAL B/G, Nordic
/16	PAL B/G, Spain / Nordic
/38/39	SECAM L, L' & PAL B/G, I
/58/59	PAL/SECAM B/G, D/K
/60	PAL/SECAM, D/K

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1. Technical specifications, Features, List of PWBs

1.1 Survey of sets and PWB's with software versions

		SYSTEMS										AMB Apollo Mother Board software versions Central Control-μP Pos. 7899						Shuttle Board	CINCH Board	front	TAPE DECK								
		System off air						Rec/Pb standard				Chapter 3, page 1 - 34						35	35	36	Chapter 4								
		PAL BG	PAL I	SECAM BG	SECAM L/L'	PAL/SECAM DK	SECAM K1	PAL	SECAM	MESECAM	Pb NTSC on PAL TV	Pb Black & White																	
VR101/02		✓						✓			✓						✓								✓				
VR101/39		✓	✓	✓	✓			✓	✓	✓	✓							✓							✓				
VR101/58		✓		✓		✓		✓		✓	✓							✓							✓				
VR110/02		✓						✓																✓					
VR110/07			✓					✓						✓											✓				
VR110/58		✓		✓		✓		✓		✓	✓			✓										✓					
VR200A/02		✓						✓										✓						✓					
VR200A/07			✓					✓										✓	✓						✓				
VR200A/39		✓	✓	✓	✓			✓	✓	✓	✓							✓	✓					✓					
VR200A/58		✓		✓		✓		✓		✓	✓							✓						✓					
VR210/02		✓						✓																✓					
VR210/07			✓					✓										✓							✓				
VR210/39		✓	✓	✓	✓			✓	✓	✓								✓						✓					
VR210/58		✓		✓		✓		✓		✓	✓													✓					
VR210/60							✓	✓		✓								✓						✓					
VR215/02		✓						✓										✓							✓				
VR215/07			✓					✓										✓							✓				
VR217/02		✓						✓										✓							✓				
VR217/07			✓					✓										✓							✓				
VR260/02		✓						✓										✓							✓				
VR260/07			✓					✓										✓						✓					
VR260/39		✓	✓	✓	✓			✓	✓	✓	✓							✓						✓					
VR260/58		✓		✓		✓		✓		✓	✓													✓					
VR400A/58		✓		✓		✓		✓		✓	✓							✓											
VR401/58		✓		✓		✓		✓		✓	✓																		
VR410/02		✓						✓																					
VR410/39		✓	✓	✓	✓			✓		✓	✓							✓											
VR410/58		✓		✓		✓		✓		✓	✓																		
VR460/02		✓						✓										✓											
VR460/39		✓	✓	✓	✓			✓	✓	✓	✓							✓						✓					
VR460/58		✓		✓		✓		✓		✓	✓							✓						✓					
VR501/02		✓						✓											✓										
VR501/16		✓						✓											✓										
VR501/58		✓		✓		✓				✓	✓								✓										
VR510/02		✓						✓																					
VR510/07			✓					✓										✓											
VR510/16		✓						✓																					
VR510/39		✓	✓	✓	✓			✓	✓	✓	✓																		
VR510/58		✓		✓		✓		✓		✓	✓																		

	SYSTEMS											AMB Apollo Mother Board software versions Central Control-μP Pos. 7899						Shuttle Board	CINCH Board front		TAPE DECK					
	System off air						Rec/Pb standard					Chapter 3, page 1 - 34						35	35	36	Chapter 4					
	PAL BG	PAL I	SECAM BG	SECAM L/L'	PAL/SECAM DK	SECAM K1	PAL	SECAM	MESECAM	Pb NTSC on PAL TV	Pb Black & White		ACAP1-xU	ACAP2-xU	ACAP3-xU	ACAP4-xU	ACAP5-xU	ACAP6-xU	ACAB1-xU	ASP10	ACP10	QBOG1	A12T-P2/0	A12T-P2/0LP	AT-S4/0	AT-S4/2
VR600A/02	✓						✓			✓	✓								✓			✓				✓
VR600A/07		✓					✓			✓	✓								✓			✓				✓
VR600A/16	✓						✓			✓	✓								✓			✓				✓
VR600A/39	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓			✓				✓
VR605A/58	✓		✓		✓		✓		✓	✓	✓								✓	✓	✓	✓				✓
VR607A/02	✓						✓			✓	✓								✓	✓	✓	✓				✓
VR607A/07		✓					✓			✓	✓								✓	✓	✓	✓				✓
VR607A/16	✓						✓			✓	✓								✓	✓	✓	✓				✓
VR607A/39	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓	✓	✓	✓				✓
VR610/02	✓						✓			✓	✓			✓												✓
VR610/07		✓					✓			✓	✓							✓								✓
VR610/16	✓						✓			✓	✓					✓										✓
VR610/39	✓	✓	✓	✓			✓	✓	✓	✓	✓			✓												✓
VR610/60						✓	✓	✓	✓	✓	✓			✓												✓
VR617/02	✓						✓			✓	✓			✓												✓
VR617/07		✓					✓			✓	✓							✓								✓
VR617/16	✓						✓			✓	✓					✓										✓
VR617/58	✓				✓		✓		✓	✓	✓				✓											✓
SB130/03	✓						✓						✓										✓			
SB130/38	✓	✓	✓	✓			✓	✓	✓				✓										✓	✓		
SB135/03	✓						✓			✓	✓								✓				✓			
SB135/07		✓					✓			✓	✓								✓				✓	✓		
SB135/11	✓						✓			✓	✓								✓				✓	✓		
SB135/16	✓						✓			✓	✓								✓				✓	✓		
SB135/38	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓				✓	✓		
SB435/11	✓						✓			✓	✓								✓				✓			✓
SB435/38	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓						✓	✓
SB535/38	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓			✓			✓	
SB635/03	✓						✓			✓	✓								✓							✓
SB635/11	✓						✓			✓	✓								✓							✓
SB635/16	✓						✓			✓	✓								✓							✓
SB635/38	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓							✓
SB735/03	✓						✓			✓	✓								✓			✓				✓
SB735/11	✓						✓			✓	✓								✓			✓				✓
SB735/38	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓			✓				✓
20D V20/39	✓	✓	✓	✓			✓	✓	✓				✓										✓			
25D V20/39	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓				✓			
45D V20/39	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓						✓	
65D V20/39	✓	✓	✓	✓			✓	✓	✓	✓	✓								✓							✓

1.2 Features

[illegible]

	VR260/07	VR260/39	VR260/58	VR400A/58	VR401/58	VR410/02	VR410/39	VR410/58	VR460/02	VR460/39	VR460/58	VR501/02	VR501/16	VR501/58	VR510/02	VR510/07	VR510/16	VR510/39	VR510/58
General																			
Low power Standby [W]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Auto Standby ON/OFF	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Backup of presets (yr)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Backup of clock / timer (hrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tuning presets	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Number of events / month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Systems																			
Sound system: mono	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sound system: stereo												✓	✓	✓	✓	✓	✓	✓	✓
Sound system: Nicam												✓	✓		✓	✓	✓	✓	✓
Cable tuner hyperband, VHF/UHF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Splitter		✓					✓			✓								✓	
Modulator Ch 21 - 55 (manual adjust)	✓		✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓		✓
Modulator Auto Seek	✓															✓			
Mechanism																			
Video heads	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
FM-audio heads (for stereo)												2	2	2	2	2	2	2	2
Head cleaning mode automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Winding time E180 [sec]	100	100	100	100	100	100	100	100	100	100	100	260	260	260	100	100	100	100	100
Rewind time E180 [sec]	100	100	100	100	100	100	100	100	100	100	100	170	170	170	100	100	100	100	100
Quick View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape lenghts recognition automatic	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
Tape counter: linear relative (h.m.s.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape counter: time left (h.m.)	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
VISS: next/prev. index / blank tape search	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Features												✓	✓	✓	✓	✓	✓	✓	✓
Plug & Play	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OSD	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto -search, -store, -tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Easy Link (P50)	✓	✓	✓			✓	✓	✓	✓	✓	✓								
Follow TV (analog)				✓								✓	✓	✓					
Direct Record (analog)				✓								✓	✓	✓					
16:9 (pin 8) switch	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Plug & Play	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Studio Picture Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commercial Skip	✓	✓	✓						✓	✓	✓								
Turbo Timer	✓	✓	✓	✓			✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
Daily/weekly	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Show View (SV) / Video Plus+(V+)	V+	SV	SV	SV		SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	V+	SV	SV
VPS+PDC (VPD)	VPD	VPD	VPD	VPD		VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD
Time (VPDC) Date (PDC) download	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Record-prepared mode (from SCART 2)	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sat control via Mouse	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Child lock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TV - Remote Multicode	✓	✓	✓						✓	✓	✓								
VCR1/VCR2 selection	✓	✓	✓						✓	✓	✓								
OTR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Longplay	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto Longplay	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
Continuous playback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audio dubbing	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Connectors																			
Audio out: cinch (rear)												✓	✓	✓	✓	✓	✓	✓	✓
Audio / Video in: cinch (front)	✓	✓	✓						✓	✓	✓								
Number of scart connectors	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
ShowView mapping	✓	✓	✓						✓	✓	✓								

	VR600A/02	VR600A/07	VR600A/16	VR600A/39	VR605A/58	VR607A/02	VR607A/07	VR607A/16	VR607A/39	VR610/02	VR610/07	VR610/16	VR610/39	VR610/60	VR617/02	VR617/07	VR617/16	VR617/58	SB130/03	SB130/38
General																				
Low power Standby [W]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Auto Standby ON/OFF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Backup of presets (yr)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Backup of clock / timer (hrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tuning presets	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Number of events / month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Systems																				
Sound system: mono	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sound system: stereo	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Sound system: Nicam		✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		
Cable tuner hyperband, VHF/UHF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Splitter				✓					✓				✓	✓						✓
Modulator Ch 21 - 55 (manual adjust)	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	✓	
Modulator Auto Seek		✓					✓				✓					✓				
Mechanism																				
Video heads	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2
FM-audio heads (for stereo)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
Head cleaning mode automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Winding time E180 [sec]	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	260	260
Rewind time E180 [sec]	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	170	170
Quick View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape lengths recognition automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Tape counter: linear relative (h.m.s.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape counter: time left (h.m.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
VISS: next/prev. index / blank tape search	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Features																				
Plug & Play	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
OSD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Auto -search, -store, -tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Easy Link (P50)										✓	✓	✓	✓	✓	✓	✓	✓	✓		
Follow TV (analog)	✓	✓	✓	✓	✓	✓	✓	✓	✓											
Direct Record (analog)	✓	✓	✓	✓	✓	✓	✓	✓	✓											
16:9 (pin 8) switch										✓	✓	✓	✓	✓	✓	✓	✓	✓		
Plug & Play	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Studio Picture Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commercial Skip															✓	✓	✓	✓		
Turbo Timer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Daily/weekly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Show View (SV) / Video Plus+(V+)	SV	V+	SV	SV	SV	SV	V+	SV	SV	SV	V+	SV	SV	SV	SV	V+	SV	SV		
VPS+PDC (VPD)	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD		
Time (VPDC) Date (PDC) download	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Record-prepared mode (from SCART 2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Sat control via Mouse	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Child lock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TV - Remote Multicode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
VCR1/VCR2 selection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
OTR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Longplay	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Auto Longplay										✓	✓	✓	✓	✓	✓	✓	✓	✓		
Continuous playback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audio dubbing	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Connectors																				
Audio out: cinch (rear)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Audio / Video in: cinch (front)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Number of scart connectors	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2
ShowView mapping															✓	✓		✓		

	SB135/03	SB135/07	SB135/11	SB135/16	SB135/38	SB435/11	SB435/38	SB535/38	SB635/03	SB635/11	SB635/16	SB635/38	SB735/03	SB735/11	SB735/38	20DV20/39	25DV20/39	45DV20/39	65DV20/39
General																			
Low power Standby [W]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Auto Standby ON/OFF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Backup of presets (yr)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Backup of clock / timer (hrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tuning presets	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Number of events / month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Systems																			
Sound system: mono	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sound system: stereo									✓	✓	✓	✓	✓	✓	✓				✓
Sound system: Nicam										✓	✓	✓		✓	✓				✓
Cable tuner hyperband, VHF/UHF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Splitter					✓		✓	✓				✓			✓	✓	✓	✓	✓
Modulator Ch 21 - 55 (manual adjust)	✓	✓	✓	✓		✓			✓	✓	✓		✓	✓					
Modulator Auto Seek		✓																	
Mechanism																			
Video heads	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	2	2	4	4
FM-audio heads (for stereo)									2	2	2	2	2	2	2				2
Head cleaning mode automatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Winding time E180 [sec]	260	260	260	260	260	260	260	100	260	260	260	260	100	100	100	260	260	260	260
Rewind time E180 [sec]	170	170	170	170	170	170	170	100	170	170	170	170	100	100	100	170	170	170	170
Quick View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape lenghts recognition automatic								✓					✓	✓	✓				
Tape counter: linear relative (h.m.s.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tape counter: time left (h.m.)								✓					✓	✓	✓				
VISS: next/prev. index / blank tape search	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Features																			
Plug & Play	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
OSD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Auto -search, -store, -tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Easy Link (P50)																			
Follow TV (analog)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Direct Record (analog)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
16:9 (pin 8) switch								✓	✓	✓	✓	✓	✓	✓	✓				✓
Plug & Play	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Studio Picture Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commercial Skip																			
Turbo Timer																			
Daily/weekly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Show View (SV) / Video Plus+(V+)	SV	V+	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV		SV	SV	SV
VPS+PDC (VPD)	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD	VPD		VPD	VPD	VPD
Time (VPDC) Date (PDC) download	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Record-prepared mode (from SCART 2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Sat control via Mouse	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Child lock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TV - Remote Multicode								✓					✓	✓	✓				
VCR1/VCR2 selection																			
OTR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Longplay		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Auto Longplay		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Continuous playback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audio dubbing	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Connectors																			
Audio out: cinch (rear)									✓	✓	✓	✓	✓	✓	✓				✓
Audio / Video in: cinch (front)								✓					✓	✓	✓				
Number of scart connectors	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
ShowView mapping																			

1.3 Technical specification

Mains voltage	: 220 - 240 V, +/- 10%
Mains frequency	: 45 - 65 Hz
Power consumption	: mono 12.5 W during operation
	: HiFi 16 W during operation
without Low Power Standby	: mono 4 W during standby
	: HiFi 4.4 W during standby
with Low Power Standby	: < 4 W standby
Ambient temperature	: +10°C to +35°C
Relative humidity	: 20 - 80 %
Dimensions	: 380 x 260 x 94 mm
Weight	: 3,7 kg
Fast forward/rewind time (turbo)	: typ. 100s (E180 cass.)
Position of use	: horizontally, max. 15°
Video resolution	: ≥240 lines
Audio SP: Linear Audio	: 80Hz - 10kHz (±6 dB)
Audio LP: Linear Audio	: 80Hz - 5kHz (±6 dB)
Stereo FM Audio	: 20Hz - 20kHz (±3dB)

Euroconnector (AV1) SCART plug 1

Connection to TV, monitor, projection TV ...

Pin 1	ARO (audio right out)	500 mV _{rms} +/- 3 dB	R _{out}	1 kOhm
Pin 2	ARI (audio right in)	0,2 V _{rms} to 2V _{rms}	R _{in}	10 kOhm
Pin 3	ALO (audio left out)	500 mV _{rms} +/- 3 dB	R _{out}	1 kOhm
Pin 6	ALI (audio left in)	0,2 V _{rms} to 2 V _{rms}	R _{in}	10 kOhm
Pin 7	Blue (out) **)			
Pin 8	Switching output:	(with R _{load} = 10kOhm, C _{load} < 2nF)		
		low: 2 V		
		high: 9.5 V		
		rise time: 5 ms		

Pin 11 Green (out) **)

Pin 15 Red (out) **)

Pin 16 Blanking (out) **) loop through enabled during standby, view-mode

Pin 19	CVBS II (video out)	1 V _{pp} +1/-2dB	R _{out}	75 Ohm
Pin 20	CVBS I (video in)	1 V _{pp} +3/-3dB	R _{in}	75 Ohm

**) passive loop through from AV2

Euroconnector (AV2) SCART plug 2

Connection to decoder, SAT tuner, video disc, 2nd VCR ...

Pin 1	ARO (audio right out)	500 mV _{rms} +/- 3 dB	R _{out}	1 kOhm
Pin 2	ARI (audio right in)	0,2 V _{rms} to 2V _{rms}	R _{in}	10 kOhm
Pin 3	ALO (audio left out)	500 mV _{rms} +/- 3 dB	R _{out}	1 kOhm
Pin 6	ALI (audio left in)	0,2 V _{rms} to 2 V _{rms}	R _{in}	10 kOhm
Pin 7	Blue (out) **)			
Pin 8	Switching input only:	low: 2 V (low)	R _{in}	10 kOhm
		high: 4.5 V (high)	R _{in}	10 kOhm

Pin 11 Green (in) *)

Pin 15 Red (in) *)

Pin 16 Blanking (in) *) loop through enabled during standby, view-mode

Pin 19	CVBS II (video out)	1 V _{pp} +1/-2dB	R _{out}	75 Ohm
Pin 20	CVBS I (video in)	1 V _{pp} +3/-3dB	R _{in}	75 Ohm

*) passive loop through to Euroconnector AV1

Cinch Audio/Video input on front panel (OPTION)

Audio:

AINFR (audio right in) red	0.2 V _{rms} to 2 V _{rms}	typ. 500 mV _{rms}
AINFL (audio left in) white	0.2 V _{rms} to 2 V _{rms}	typ. 500 mV _{rms}
Input impedance	47 kOhm	

Video:

VFR yellow	1 V _{pp} + 3 / -3 dB
Input impedance	75 Ohm

Cinch Audio Out Rear (OPTION)

AOUT1R (audio right out) red	500 mV _{rms} +/- 3 dB	R _{out}	1 kOhm
AOUT1L (audio left out) white	500 mV _{rms} +/- 3 dB	R _{out}	1 kOhm

This outputs are in parallel with the corresponding outputs on Euroconnector 1.

TUMOD

Modulator:

Frequency range loop through	45 MHz - 860 MHz
Gain: ANT IN - TV OUT	2 dB + 3 / -2 dB
ANT IN - TUN OUT	2 dB + 3 / -2 dB
Switch for RF input attenuation	NO
Frequency range out (tuned by IIC bus)	Ch 21 - Ch55


Tuner:

Frequency range	43 MHz - 860 MHz
for UK	450 MHz - 860MHz

Input voltage	max.	< 100 dBμV
	min.	> 60 dBμV

2. Safety instructions, Modifications

2.1 Safety instructions

- Safety regulations demand that the set be restored to its original condition and that components identical with the original types be used.
- Safety components are marked by the symbol .
- All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair may reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools on the same potential.
- A set to be repaired should always be connected to the mains via a suitable isolating transformer.
- Never replace any modules or any other parts while the set is switched on.
- Use plastic instead of metal alignment tools. This in order to preclude short-circuit or to prevent a specific circuit from being rendered unstable.

2.1.1 Remarks

- The direct voltages and oscillograms ought to be measured relative to the set mass.
- The direct voltages and oscillograms mentioned in the diagrams ought to be measured with a colour bar signal and the picture carrier at 503.25 MHz (C25).
- The oscillograms and direct voltages have been measured in RECORD or PLAY mode.
- The semiconductors, which are mentioned in the circuit diagram and in the parts lists, are fully exchangeable per position with the semiconductors in the set, irrespective of the type designation of these semiconductors.

Engineer's remarks:

[illegible][illegible]

2.2 Modifications

2.2.1 Updating the service manual

All modifications and/or supplements to the Service Manual are published by means of Service Information bulletins.

Each Service Information is numbered:



A Service Information bulletin consists of a front page which, if needed, is followed by supplementary and/or replacement sheets.

Replacement sheets should replace existing sheets in the Service Manual. These sheets are identified by an additional letter after the page number.

Example: Page 5-1a replaces page 5-1 in the Service Manual.

Supplementary sheets should be inserted between existing sheets in the Service Manual. These sheets are identified by an additional figure after the page number.

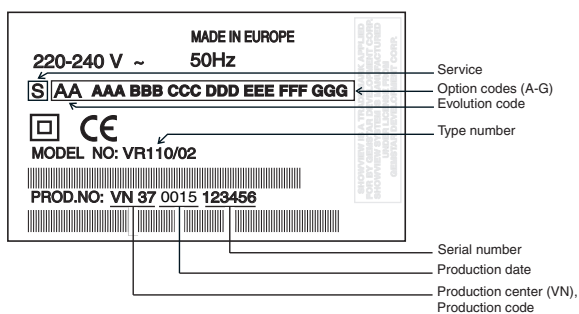
Example: Page 5-1-1 should be inserted after page 5-1.

2.2.2 Modifications in the set

All important parts of the set (such as the tape deck, the printed circuits and modules) are equipped with a sticker. Those stickers provide a number of important information.

Type plate

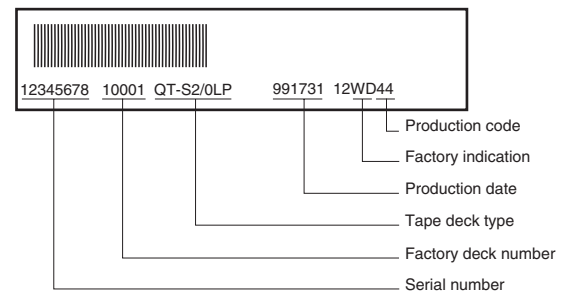
The type plate is located on the back cover.



Note:

- In case of an important change in the set, the production code on the type plate is incremented: E.g. 37 becomes 38.
- In case of a major change in the set, the evolution code is incremented: E.g. AA becomes AB.

Tape deck



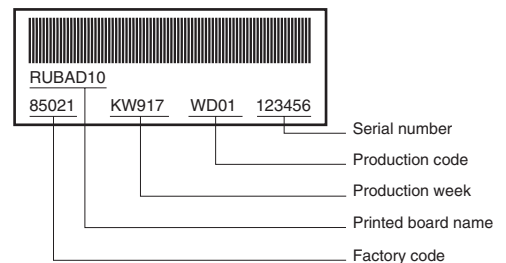
Note:

- The production code and the serial number on the tape deck do not correspond to the production code and the serial number on the type plate.

Printed circuits

The sticker is generally located on the copper side of the board.

Example:



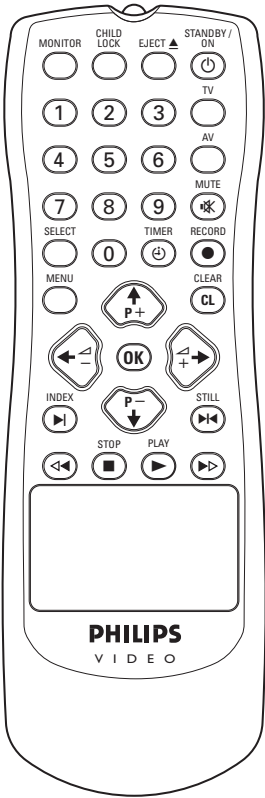
Note:

- The production code number might not always be mentioned.

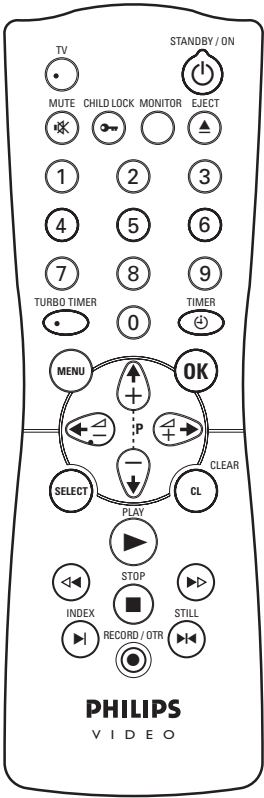
In case of an important modification, the last figure of the factory code number (point number) is increased by one: E.g. 8502.1 becomes 8502.2

3. Direction for use

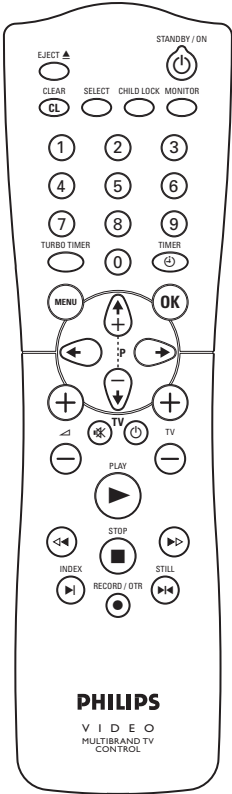
Remote control:



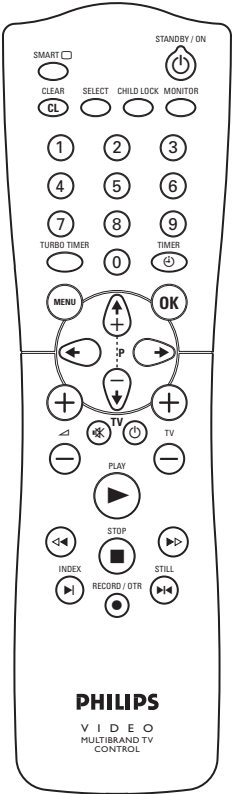
RT111
RT116



RT112





RT113




RT114

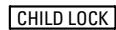
Remote control

 **SMART:** To adjust the picture setting during playback

 **Switch off:** To switch off set, interrupt menu function, interrupt a programmed recording (TIMER)

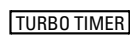
 **Delete:** To delete last entry/Clear programmed recording (TIMER)


 **Select:** To select a function


 **Child Lock:** To switch child lock on/off


 **TV monitor:** To switch between TV reception and VCR playback

 **Number buttons:** 0 - 9


 **TurboTimer** Aufnahmen programmieren mit der Funktion TurboTimer


 **TIMER:** To make a manual TIMER programming or to alter or clear a programmed TIMER


 **Menu:** To call up or end main menu


 **Store/Confirm:** To store or confirm entry


 **Select:** Cursor left


 **Select:** Cursor right


 **Select:** To select a programme number

 **Select:** To select a programme number

 **Playback:** To play a recorded cassette

 **Rewind:** During STOP and STANDBY: rewind, during PLAYBACK: reverse scanning

 **Pause/Stop:** To stop the tape, except while a TIMER-recording is being made

 **Forward wind:** During STOP and STANDBY: forward wind, during PLAYBACK: forward scanning

 **Index search:** In combination with  /  : to search for previous or next recording on the cassette.


 **Record:** To record the programme selected

 **Still picture:** To stop the tape and show a still picture

Additional TV functions


 **TV volume:** TV volume up

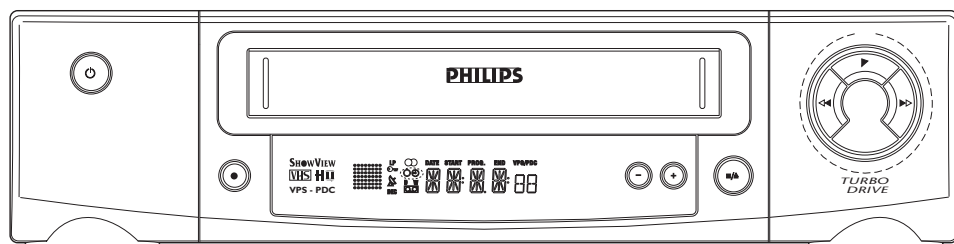
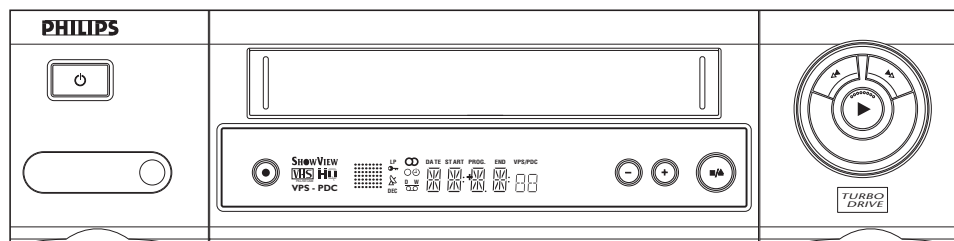
 **TV volume:** TV volume down

 **TV sound off:** To switch the sound on or off

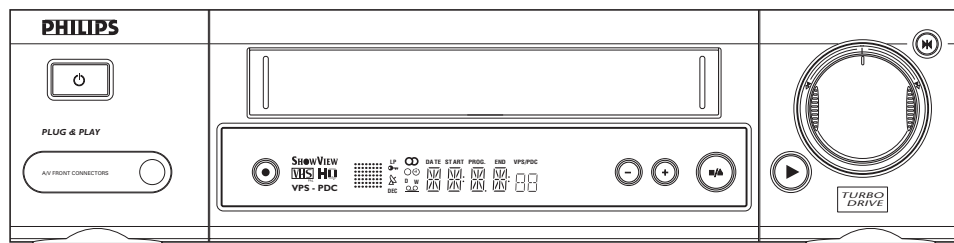
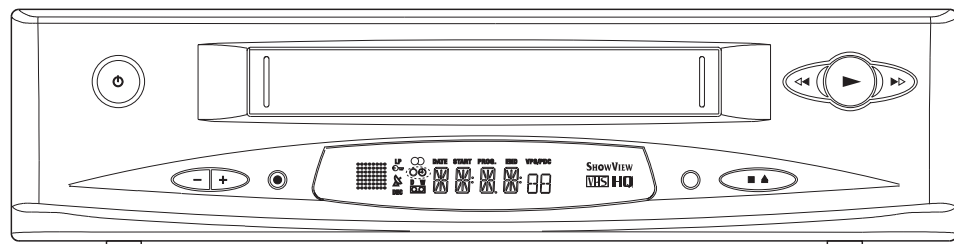
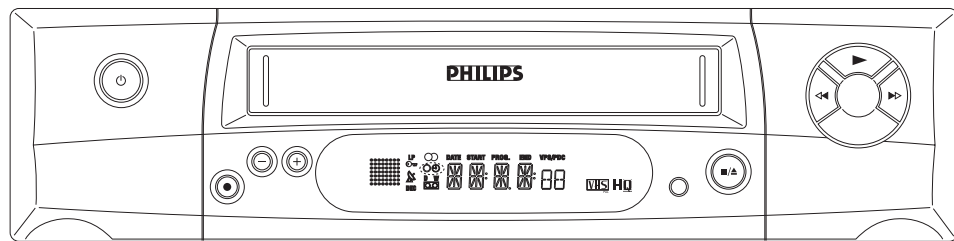
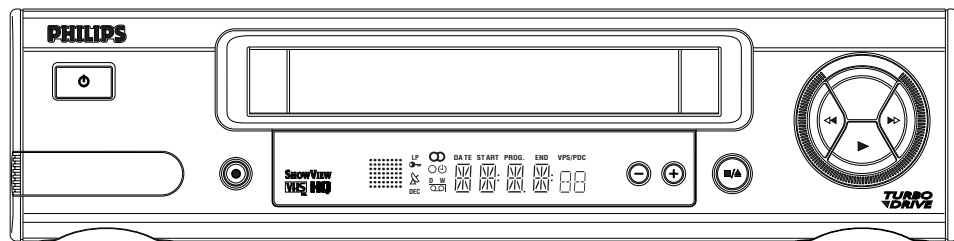
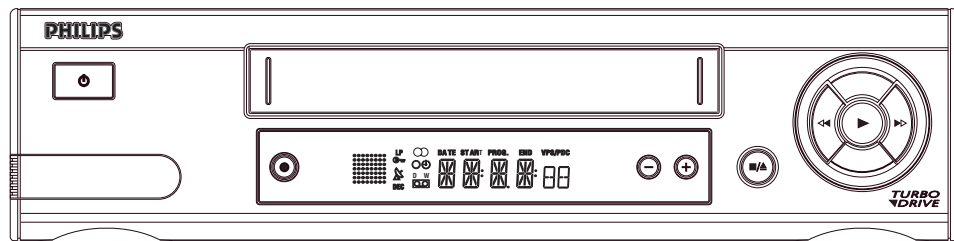
 **Switch off:** To switch off the TV

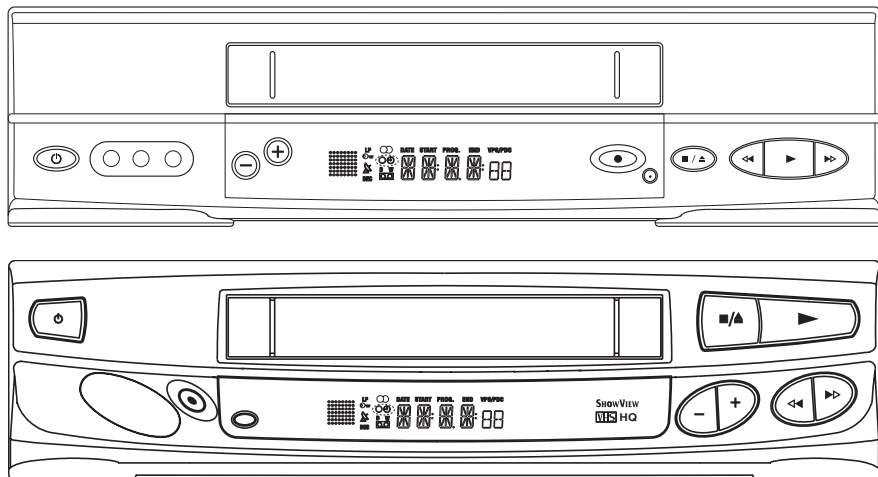
 **TV Programme number:** TV programme number up

 **TV Programme number:** TV programme number down

VR200A
VR400A

VR600A

VR605A
VR607AVR101
VR501VR110
VR401
VR510VR210
VR410VR215
VR217
VR260
VR460
VR610
VR617

SB130
SB135
SB43520DV20
25DV20

STANDBY **Standby** : To switch off or on, interrupt a function, interrupt a programmed recording (TIMER)

RECORD **Record** : To record the programme selected

AUDIO **Audio input socket left/right** : To connect a camera recorder or video recorder (programme number 'E3')

VIDEO **Video input socket** : To connect a camera recorder or video recorder ('E3')

PROGRAMME **Select** : One line or programme number down.

PROGRAMME **Select** : One line or programme number up.

MONITOR **TV monitor** : To switch between TV reception and VCR playback

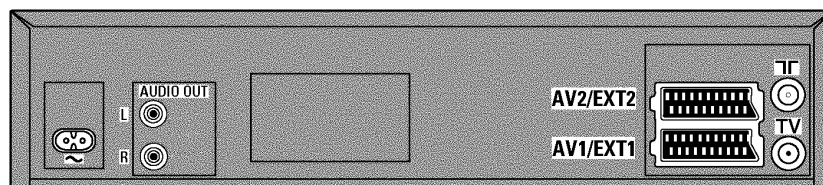
Rewind : During STOP and STANDBY: rewind, during PLAYBACK: reverse scanning

Playback : To play a cassette

Forward wind : During STOP and STANDBY: forward wind, during PLAYBACK: forward scanning

STOP/EJECT **Pause/Stop, eject cassette** : To stop the tape and eject the cassette

Rearside



Mains socket : To connect the mains cable

AUDIO OUT L R **Audio output socket, left/right** : To connect a HiFi-set

AV2 EXT2 **Scart socket 2** : To connect a satellite receiver, decoder, video recorder, etc. (programme number 'E3')

AV1 EXT1 **Scart socket 1** : To connect the TV set (programme number 'E3')

Aerial input socket : To connect the aerial cable

Aerial output socket : To connect the TV set

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1. CONNECTING YOUR VIDEO RECORDER

Special functions on your video recorder

Digital Studio
Picture Control

Philips has developed a system which produces the best possible playback quality. It reduces disturbance on old, worn video cassettes, and emphasises the detail on very good quality cassettes.

Smart Picture

This function allows you to save the playback settings that suit you best. Select your own personal settings for the type of film you are currently watching.

Plug & Play

Philips provides the best possible connection between your video recorder and other home cinema equipment.

Multibrand
TV control

You can operate the main functions on your television using your video recorder remote control, even if your television is not a Philips one.

Automatic
Satellite Recording

Recordings made on your video recorder can be controlled by an external satellite receiver.

Direct Record

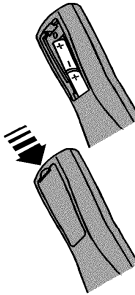
Your video recorder can ascertain which channel is currently playing on your television and record from it at the touch of a button.

SHOWVIEW[®]
DELUXE

Simple programming system for video recorders. Makes programming as easy as making a telephone call. Simply enter the programme code which you will find in your listings magazine.

Placing the batteries in the remote control

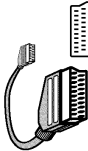
- 1 Open up the battery compartment of your remote control and place the batteries in it as shown in the picture.



- 2 Close the battery compartment.

Connecting your video recorder to the TV set

We recommend the use of a scart cable. This will give you the best picture and sound quality.



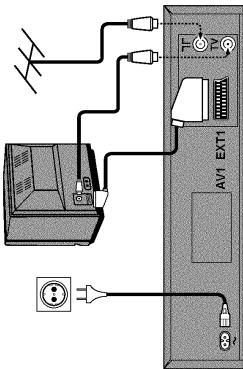
If you install your video recorder for the first time, select one of the following options:

- ☐ **'Connecting with a scart cable and Easy Link'**
If your TV set is equipped with 'Easy Link/NexTVview, Megalogic,...'
- ☐ **'Connecting with a scart cable without Easy Link'**
If your TV set is not equipped with 'Easy Link/NexTVview, Megalogic,...'
- ☐ **'Connecting without a scart cable'**
If you are not using a scart cable.

Connecting with a scart cable and 'Easy link'



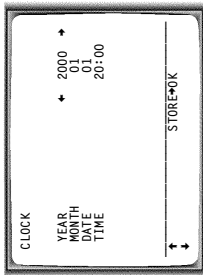
With the function 'Easy Link', your video recorder can exchange information with the television (see instruction manual TV set). With 'Easy Link' the TV channels from the TV will automatically be loaded.



- 1 Switch off the TV set.
- 2 Remove the aerial cable plug from your TV set and insert it into the socket at the back of the video recorder.
- 3 Plug one end of the aerial cable provided into the socket on the video recorder and the other end into the aerial input socket on your TV set.
- 4 Plug one end of the special scart cable provided into the scart socket at the back of the video recorder and the other end into the suitable scart socket on your TV set (see instruction manual TV set).
- 5 Switch on the TV set.
- 6 Insert one end of the mains cable into the mains socket at the back of the video recorder and the other end into the wall socket.
- ☐ The video recorder will automatically load all TV channels stored on your TV, in the same sequence. This may take several minutes.
- ☐ When the information has been copied, the language selection will appear on the TV screen.
- 7 select the language for the on-screen display (OSD) with or and confirm with .

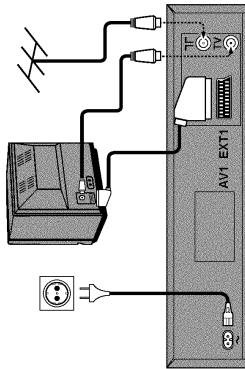
The small display on the video recorder can only show english text.

- 8** Select the country of your residence with **[P+]** or **[P-]**. If this country does not show up, select 'OTHERS'.
- 9** Confirm with **[OK]**.
- ☐ Next, 'TIME', 'YEAR', 'MONTH', 'DATE' will appear on the TV screen.



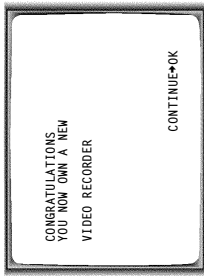
- 10** Check if the year in line 'YEAR' is correct. Change it if required with the number buttons **[0-9]** on the remote control.
- 11** Select the next line with **[P+]** or **[P-]**.
- 12** Check 'MONTH' and 'DATE', 'TIME' in the same way.
- 13** When all the information is correct, confirm with **[OK]**.
- The initial installation is now complete.

Connecting with a scart cable without 'Easy Link'



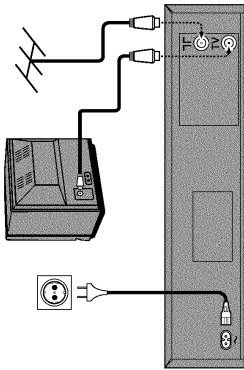
- 1** Switch off the TV set.
- 2** Remove the aerial cable plug from your TV set and insert it into the **[T]** socket at the back of the video recorder.
- 3** Plug one end of the aerial cable provided into the **[R]** socket on the video recorder and the other end into the aerial input socket on your TV set.

- 4** Plug one end of the scart cable into the **[AV1 EXT1]** scart socket at the back of the video recorder and the other end into the suitable scart socket on your TV set (see instruction manual TV set).
- 5** Switch on the TV set.
- 6** Insert one end of the mains cable into the mains socket **[~]** at the back of the video recorder and the other end into the wall socket.
- 7** If your TV set **automatically switches** to programme number e.g.: 'EXT', '0', or 'AV', this text will appear on the TV screen:



- 8** If your TV set does not switch to programme number e.g.: 'EXT', '0', or 'AV' automatically, select the programme number for the video recorder manually (see instruction manual TV set).
- 9** When the TV has been tuned read the paragraph 'Initial installation' in the chapter 'INSTALLING YOUR VIDEO RECORDER'.

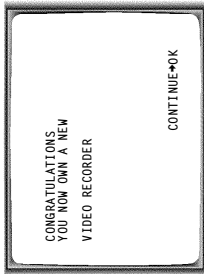
Connecting without a scart cable



- 1** Switch off the TV set.
- 2** Remove the aerial cable plug from your TV set and insert it into the **[T]** socket at the back of the video recorder.
- 3** Plug one end of the aerial cable provided into the **[R]** socket on the video recorder and the other end into the aerial input socket on your TV set.

- 4** Insert one end of the mains cable into the mains socket **[~]** at the back of the video recorder and plug the other end into the wall socket.
- 5** Switch on your TV set and select the programme number that you have chosen for video playback (see instruction manual TV set).

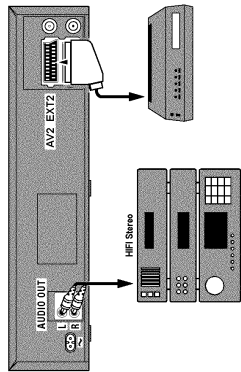
- 6** Tune in the TV set until this picture appears.
- 7** The video recorder will now transmit on channel 36/ Frequenz 591MHz.



- 8** If the picture quality of TV channels on your TV is poor, please read the section 'Reducing picture disturbance - optimizing the modulator' in the chapter 'ADDITIONAL FUNCTIONS'.
- 9** When the TV has been tuned read the paragraph 'Initial installation' in the chapter 'INSTALLING YOUR VIDEO RECORDER'.

Connecting other equipment

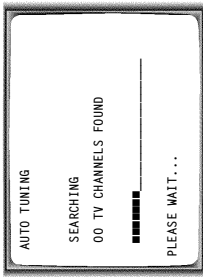
You can connect additional equipment to the **[AV2 EXT2]** socket. For example: a decoder, a satellite receiver or a camera recorder.



2. INSTALLING YOUR VIDEO RECORDER

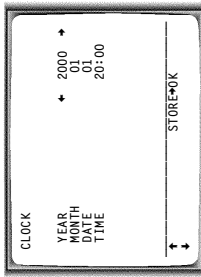
Initial installation

- 1 Confirm the picture on the TV screen with **[OK]** on the remote control.
- 2 Select the language for the on-screen display (OSD) with **[←P+]** or **[P+]→**.
The display on the video recorder will only show english text.
- 3 Confirm with **[OK]**.
- 4 Select the country of your residence with **[←P+]** or **[P+]→**.
If this country does not show up, select 'OTHERS'.
Confirm with **[OK]**.
'Automatic TV channel search' starts. This picture will appear on the screen:



Wait until all TV channels have been found. This can take several minutes.

- 5 When all TV channels have been found, 'STORED' will appear on the TV screen.
'YEAR', 'MONTH', 'DATE', 'TIME' will appear on the TV screen.



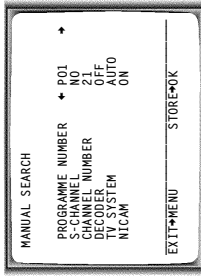
- 6 Check if the year in line 'YEAR' is correct. Change it if required with the number buttons **[0-9]** on the remote control.
- 7 Select the next line with **[P+]→** or **[←P+]**.
- 8 Check 'MONTH' and 'DATE', 'TIME' in the same way.
- 9 When all the information is correct, confirm with **[OK]**.
The initial installation is now complete.

- 1 If you have connected a satellite receiver, please read the section 'Satellite receiver'.
- 2 If you have connected a decoder, you must install it as described in the next section.
- 3 If you experience sound distortion or no sound at all with some TV channels, you may have selected the wrong TV system for these TV channels. In the chapter 'Manual TV channel search' you will find the information on how to change the TV system.

Allocating a decoder

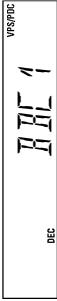
Some TV stations will send coded TV channels, that you can only watch when you use a decoder. You can connect such a decoder (descrambler) to your video recorder. With the following function, the connected decoder will automatically be activated for the TV programme you want to watch.

- 1 With 'Connecting with scart cable and 'Easy Link' the decoder must be activated for the TV set (see instruction manual TV set).
- 1 Switch on the TV set. If required, select the programme number for the video recorder.
- 2 On the video recorder, use **[P+]→** or **[←P+]** or number buttons **[0-9]** on the remote control to select the programme number you want to allocate the decoder to.
- 3 Press **[MENU]** on the remote control. The main menu will appear.
- 4 Select the line 'MANUAL SEARCH' with **[P+]→** or **[←P+]** and confirm with **[OK]**.



- 5 Select the line 'DECODER' with **[P+]→** or **[←P+]**.
- 6 Select function 'ON' with **[←]** or **[→]**.
- 7 When you select 'OFF', the decoder will not be allocated.
- 7 Confirm with **[OK]**.

- 8 To end, press **[MENU]**.
Your decoder has now been allocated to this TV channel.
- 2 When the function is switched on, 'DEC' will appear in the video recorder display for the TV channel you have selected.

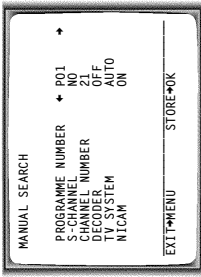


Manual TV channel search

In certain cases the 'Automatic TV channel search' may not be able to find all of the TV channels (e.g. coded TV channels). In that case, use this manual method to set the channels.

- 1 With 'Connecting with scart cable and 'Easy Link', this function will start the data transfer.

- 1 Switch on the TV set. If required, select the programme number for the video recorder.
- 2 Press **[MENU]** on the remote control. The main menu will appear.
- 3 Select the line 'MANUAL SEARCH' with **[P+]→** or **[←P+]** and confirm with **[OK]**.



- 4 Select the line 'PROGRAMME NUMBER' with **[P+]→** or **[←P+]**.
- 5 Select the desired programme number (e.g.: 'P01') with **[←]** or **[→]**.
- 6 In the line 'S-CHANNEL', use **[P+]→** to select: 'NO': To enter the channel
'YES': To enter a special channel
- 7 Enter the channel of the desired TV channel in line 'CHANNEL NUMBER' with the number buttons **[0-9]**.

- 1 If you don't know the channel number of the desired TV channel, hold **[P+]→** in line 'CHANNEL NUMBER' to start the automatic search.
Repeat automatic search you until have found the desired TV channel. A changing channel number will appear on the TV screen.

- 8 If you want to allocate a decoder, in line 'DECODER' select 'ON' with **[P+]→**.
- 9 This video recorder can receive Hi-Fi sound transmissions in 'NICAM'. However, if sound distortion occurs with poor reception, you can switch 'NICAM' off. To do this, select 'OFF' in line 'NICAM' with **[P+]→** or **[←P+]**.
- 10 To change the TV system, in line 'TV SYSTEM', select the TV system with **[←P+]** or **[P+]→**.
- 11 Press **[OK]** to store the TV channel. 'STORED' will briefly appear on the TV screen.
- 2 If you want to search for further TV channels, start again at step 3.
- 12 To end, press **[MENU]**.

Satellite receiver

You can receive channels from the satellite receiver via the scart socket **[AV2EXT2]**.
To do this, select programme number **[P+]→** with **[P+]→** on the remote control and then select programme number **[P+]→** with **[P+]→**. You should select the satellite channels on the satellite receiver itself.

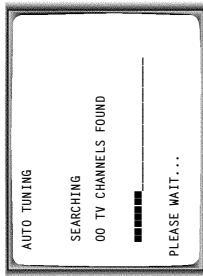
Special installation functions

You can select one of the following installation functions in order to adapt the video recorder to your own specific requirements.

Automatic TV channel search

The video recorder will search for all available TV channels.
▷ With 'Connecting with scart cable and Easy Link', this function will start the data transfer.

- 1 Switch on the TV set. If required, select the programme number for the video recorder.
- 2 Press **MENU** on the remote control. The main menu will appear on the screen.
- 3 Select the line 'AUTO TUNING' with **[-P+]** or **[↑P+]**.
- 4 Confirm with **[OK]**.
- 5 Select the country of your residence with **[↑P+]** or **[-P+]**.
- 6 Press **[OK]**. The 'Automatic TV channel search' starts. If your country doesn't show up, select 'OTHERS'.



- 7 When the TV channel search is complete, 'STORED' will appear on the screen.
 - 8 To end, press **MENU**.
- How to search for a TV channel manually, you can read in the section 'Manual TV channel search'.

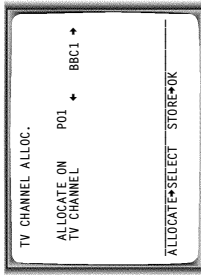
Monitor function

You can switch backwards and forwards between TV picture and video recorder picture with **[MONITOR]**. But this only works when you use a scart cable to connect the video recorder to your TV set and if your TV set responds to this switch-over.

Sorting and clearing TV channels manually

You can assign any programme number to a TV channel that you have stored and you can also delete unwanted TV channels.

- ▷ With 'Connecting with Easy Link' the video recorder automatically loads the TV channels from the TV set.
- 1 Switch on the TV set. If required, select the programme number for the video recorder.
 - 2 Press **MENU** on the remote control. The main menu will appear.
 - 3 Select the line 'TV CHANNEL ALLOC.' with **[-P+]** or **[↑P+]**.
 - 4 Confirm with **[OK]**.



- 5 With **[→]** or **[←]**, select the TV channel you want to assign a programme number to (starting with 'P01').
▷ If you want to delete a TV channel, press **[CLEAR/CL]**.
- 6 Confirm with **[SELECT]**. The following message will briefly appear on the TV screen: e.g.: 'BBC1 ALLOCATED ON P01'.

▷ When you have assigned a programme number to the last TV channel, you will automatically return to the main menu when you confirm with **[SELECT]**. To end, press **MENU**.

 - 7 Repeat steps 5 to 6 until you have given a programme number to all TV channels.
 - 8 Confirm with **[OK]**.
 - 9 To end, press **MENU**.

Setting the language

You can select the language for the on-screen display (OSD). The small display on the video recorder will only show english text.

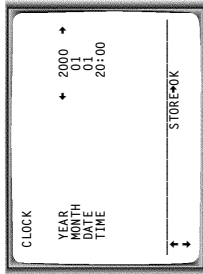
- 1 Switch on the TV set. If required, select the programme number for the video recorder.
- 2 Press **MENU** on the remote control. The main menu will appear.
- 3 Select the line 'LANGUAGE' and confirm with **[OK]**. This will appear in the display: 'STORED'.
- 4 Select your language with **[-P+]** or **[↑P+]** and confirm with **[OK]**.
- 5 To end, press **MENU**.

Setting the time and date

▷ If a TV channel which transmits TXT/PDC is stored under programme number 'P01', time and date will automatically be taken from the TXT/PDC information.

If the time in the video recorder display is not correct or if '....:..' appears in the display, please set the clock manually.

- 1 Switch on the TV set. If required, select the programme number for the video recorder.
- 2 Press **MENU** on the remote control. The main menu will appear.
- 3 Select the line 'CLOCK' with **[-P+]** or **[↑P+]** and confirm with **[OK]**.



- 4 Check the year in line 'YEAR'. If required, please change the year with the number buttons **[0-9]** on the remote control.
- 5 Select the next line with **[↑P+]** or **[-P+]**.
- 6 Check 'TIME', 'MONTH' and 'DATE' in the same way.

- 7 When all information is correct, confirm with **[OK]**. This will appear in the display: 'STORED'.
- 8 To end, press **MENU**.

3. IMPORTANT NOTES FOR OPERATION

General information

- ⚠

You can switch on with **[STANDBY/ON]**, the number buttons **[0-9]** or by putting in a cassette.
- ⚠

If you have not used the video recorder for a few minutes, it will switch to standby automatically. For more information, please read the section 'Automatic switch-off' in chapter 'additional functions'.
- ⚠

If you have switched the video recorder off with **[STANDBY/ON]**, the time will show in the display, for instance, '18:00'.
If the clock has not been set, '---:--' will appear.
- ⚠

When the video recorder is switched off and the time isn't shown in the video recorder display, the clock display may be switched off. You will find more information in the section 'Saving energy'.
- ⚠

Keep your video recorder connected to the mains at all times to ensure that programmed recordings can be made and that the television works normally. Your video recorder uses less than 4 Watt (with clock-display switched off).
- ⚠

If the video recorder is not plugged into the mains, it will usually store TV channels for a year and timer and date information for three hours.

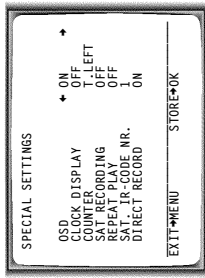
Saving energy

- To save energy, you can switch off the clock display on the video recorder. Programmed (TIMER) recordings will take place even if the clock display has been switched off.
- 1

Switch on the TV set. If required, select the programme number for the video recorder.
- 2

Press **[MENU]** on the remote control. The main menu will appear.
- 3

Select the line 'SPECIAL SETTINGS' with **[P+]** or **[P-]** and confirm with **[OK]**.



- 4

To switch off the clock display on the video recorder, select 'OFF' in line 'CLOCK DISPLAY' with **[→]**.
⚠ To switch the clock display on, select 'ON'.
- 5

Confirm with **[OK]**.
'STORED' will briefly appear on the TV screen.
- 6

To end, press **[MENU]**.

Emergency interrupt

You can use **[STANDBY/ON]** on the video recorder or the remote control to interrupt any function.
So if you are having operating problems, you can just interrupt the function and start again.
And you can practise operating your set without any worries. No matter which buttons you press, you cannot damage it.

The symbols on your video recorder display



These symbols can light up on your video recorder display:

- This is where the current operating mode is shown as a symbol.
- LP**

When you have switched on the LP (Long Play) function or when you play a tape that has been recorded in LP (Long Play).
- When you have switched on the child lock.
- When a satellite recording has been programmed.
- DEC**

When a decoder has been allocated to the TV channel you have currently selected.
- When you play a cassette that has been recorded with hifi sound, or when a hifi sound is transmitted.
- When you are making a recording.
- When you have programmed a recording or when a programmed recording is being made.
- D**

When you are programming daily recordings.
- W**

When you are programming weekly recordings.
- When you have put a cassette in the video recorder.

- DATE**

When the date of the programmed recording is shown.
- START**

When the start time of the programmed recording is shown.
- PROG.**

When the programme number of the programmed recording is shown.
- END**


When the end time of the programmed recording is shown.
- VPS/PDC**

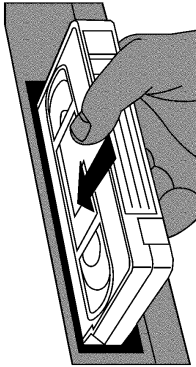
Video Programming System / Programme Delivery Control: when a VPS or PDC code is being transmitted.
- Display of programme number / tape position / channel name / function.
- BB**

Tape position in seconds, but only if the display mode 'LINEAR' has been selected.

4. PLAYBACK FUNCTIONS

Playing a cassette

- Put a cassette into the cassette slot.  will appear on the display.



- Press the **PLAY** button. This will, for example, appear in the display.



- To stop, press the **STOP** button.
- To eject the cassette, press **STOP/EJECT** on the video recorder when the video recorder is in STOP mode.

Some hired cassettes may have a poor picture or poor sound quality. This is not a fault in your machine. Please read the section 'Selecting the picture settings (SMART PICTURE)', or 'Picture interference'.

Some functions switch off automatically after a while (for example, pause, still picture, picture search). This helps to protect the cassette and avoids wasting power.

For playback, the correct recording speed will automatically be selected. Please read the section 'Selecting the recording speed (SP or LP)' in the chapter 'MANUAL RECORDING'.

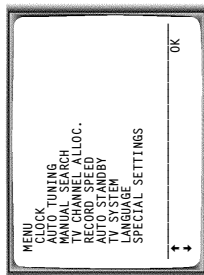
Playing NTSC cassettes

With this set you can playback cassettes that have been recorded on another video recorder in the NTSC standard (for example, American cassettes). But this only works for PAL-television sets which are suitable for a picture frequency of 60 Hz.

- When you play an NTSC cassette '50Hz' will appear on the display.
- Some special features (for example, still picture) are not possible while you are playing an NTSC cassette.

Summary of user guide

The OSD menu offers the following functions. More details on each can be found in the appropriate chapter.

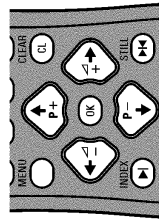


Main menu

User guide (OSD)

The OSD (On-screen display) shows the various functions in the form of a menu on the television screen. You can then choose the settings you require. There is a summary of the menus on this page. The main button functions are displayed in a help line along the bottom of the screen.

- To call up or close the menu: with **[MENU]**.
- To select a line: with **[P-]** or **[P+]**.
- To enter or change your selection: with the number buttons **[0-9]** or with **[+]** or **[-]**.
- To cancel: with **[STANDBY/ON]**.
- To save or confirm: with **[OK]**.
- To close the main menu: with **[MENU]**.



Tape position indication

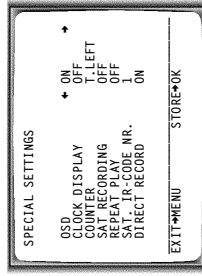
When playing a tape, by pressing the **[OK]** button, you can show the present tape position on the TV screen.

You have a choice of selecting 'LINEAR' or 'T. LEFT'.

- 'LINEAR' will show the tape position in hours, minutes and seconds.
- 'T. LEFT' will show the actual amount of playing/recording time left on the tape in hours and minutes.

When you play an NTSC cassette, the video recorder will only show 'LINEAR'.

- Switch on the TV set. If required, select the programme number for the video recorder.
- Press **[MENU]** on the remote control. The main menu will appear.
- Select the line 'SPECIAL SETTINGS' with **[P+]** or **[P-]** and confirm with **[OK]**.



- Select the line 'COUNTER' with **[P+]** or **[P-]** and confirm with **[OK]**.
- Select 'LINEAR' or 'T. LEFT' with **[P+]** and confirm with **[OK]**.

The counter 'LINEAR' will be set to '0:00:00' when you put a cassette in the machine. You can also reset the tape position to '0:00:00' when you press **[CLEAR]**.

If you rewind a cassette from the tape position '0:00:00', the counter will show for instance, '0:00:10' (the cassette will be rewound to 1 minute and 20 seconds before '0:00:00').

If there is an empty space on the tape, the counter 'LINEAR' will stop running.

Searching for tape position without the picture (wind and rewind)

- 1 Stop the tape with [STOP].
- 2 Press [◀] (reverse) or [▶] (forward). This will, for example, appear in the display.
- 3 To stop a certain place on the tape, press [STOP].



- 6 The counter type 'T', 'LEFT' will automatically recognise the length of the tape. When you put in a cassette the video recorder must first calculate the time played. Therefore, 'T', 'LEFT' appears first and only after the tape has been running for a few seconds the playing time will be shown.

- 6 To end, press [MENU].

Searching for tape position with the picture (picture search)

- 1 While a cassette is playing, press [◀] (reverse) or [▶] (forward) once or several times. This will, for example, appear in the display.
- 2 To stop a certain place on the tape, press [PLAY].
- 3 During picture search, the picture quality may not be so good and there will be no sound.



Automatic search for a tape position (index search)

- At the start of each recording, the video recorder will write an index code on the tape.
- 1 Press [INDEX] and then [▶] button to select the next code mark or [INDEX] and then [◀] for the previous code mark. This will, for example, appear in the display for the next index code.



- 2 When the video recorder finds the code mark, it will automatically switch to play.

Still picture/Slow motion

- 1 Press [STILL]. A still picture will appear on the screen. This will, for example, appear in the display.
- 2 Each time you press [STILL] again, the picture will move on one step.
- 3 When you hold [STILL], the tape will be played in slow motion.
- 4 When you press [▶] several times, you have a choice of several playback speeds.
- 5 During slow motion there will be no sound.



Automatic search for a blank space on the tape

You can search for a space on the tape (at least 1 minute of blank tape) for a new recording, for example, after an existing recording on the tape.

- 1 Press [INDEX]. Then press [STOP]. This will, for example, appear in the display.
- 2 When the video recorder find a blank space, it will automatically switch to 'pause'.
- 3 If no empty space has been found when the end of the tape is reached, the cassette will be ejected.



Skipping commercials automatically

- With this function you can skip 30 sec. on the tape.
- 1 Press [PLAY] while the tape is playing.
 - 2 The video recorder will wind the tape 30 seconds and will then switch back to playback.
 - 3 If the commercial is still on, you can press [PLAY] again.
 - 4 If you press [PLAY] while you are winding the tape, the video recorder will switch back to playback.

Selecting the picture settings (SMART PICTURE)

You can change the picture settings while a tape is playing.

- 1 Press [SMART]. This will show the current picture setting.
- 2 Press [SMART] again to select the picture settings of your choice.
 - 'NATURAL': for all types of movies (natural picture)
 - 'DISTINCT': for fast movement, sport (detailed picture)
 - 'SOFT': for hired tapes (interference is suppressed)
 - 'SHARP': for cartoons (sharp picture)
- 3 These picture settings will not change until you eject the cassette.

Picture interference

If the picture quality is poor when you play a cassette, please follow these instructions.

Tracking during playback

- 1 While a cassette is playing, hold [P+] or [P-] until the picture quality is at its best. 'TRAC' (tracking) will appear on the display.
- 2 Wait a few seconds, until 'TRAC' disappears from the display. These picture settings will not change until you eject the cassette.

Tracking during still picture

If the still picture vibrates vertically, you can improve the still picture as follows:

- 1 During still picture, hold [P+] or [P-] until the picture quality is at its best. 'LIT' will appear in the display.
- 2 When you release the button, 'LIT' will disappear. The video recorder will store these settings automatically.
- 3 Please note, however, that interference may still occur with poor quality cassettes.

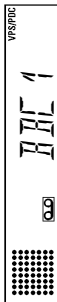
5. MANUAL RECORDING

Use 'Manual Recording' to make a spontaneous recording (for example, a programme currently being shown).

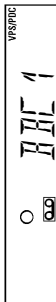
- ☐ If you want to start and stop a recording manually, read the section '**Recording without automatic switch-off**'.
- ☐ If you want to start a recording manually but have it stopped automatically, read the section '**Recording with automatic switch-off**'. This is important if you, for instance, don't want to record to the end of the cassette.
- ☐ Read the section '**Direct record**' if you want to record a programme currently being shown.
- ☐ Read the section '**Automatic recording from a satellite receiver**', if you want a recording to be controlled automatically by a satellite receiver.

Recording without automatic switch-off

- 1 Insert a cassette.
- 2 Use **[+P+]** or **[-P+]** to select the programme number you want to record, for example, 'P01'. This will appear on the display:



- ⚠ When a TV channel transmits a channel name, it will show on the video recorder display.
- ⚠ Programme numbers 'E' and 'E2' are for recording from other sources (through scart sockets **[AV1EXT1]** and **[AV2EXT2]**). Programme number 'E2' is for recording from the audio and video front sockets.
- 3 To start recording, press **[RECORD]** on the remote control or **[RECORD]** on the video recorder. This will, for instance, appear in the display.



- ⚠ With **[OK]** you can show the tape position in the display.

- 4 Stop recording with the **[STOP]** button.

Recording with automatic switch-off (OTR one-touch-recording)

- 1 Put a cassette in the machine.
 - 2 Use **[+P+]** or **[-P+]** to select the programme number you want to record.
 - 3 Press **[RECORD]** on the remote control.
 - 4 Each time you press **[RECORD]** you will add 30 minutes to the recording time.
- ⚠ To cancel this information, press **[CLEAR CL]**.

Protecting your recordings

So that you don't accidentally delete an important recording, remove the special tab on the narrow side of the cassette with a screwdriver or slide the special tab to the left. Later, if you no longer want to protect your recording, you can seal the gap again with sticky tape or slide the special tab to the right.

Auto-assembling

You can use the auto-assembling function to join individual recordings without any major picture disturbance between them.

- 1 While the cassette is playing, search for the correct position on the tape.
- 2 Stop the cassette by pressing **[STOP]**. 'H' will appear in the display.
- 3 Now start recording as usual by pressing **[RECORD]** on the remote control.
- 4 To stop recording, press **[STOP]**.

Selecting the recording speed (SP or LP)

You can reduce the recording speed by half. This makes it possible to record, for example, eight-hours instead of four-hours on an 'E240' (four-hour) cassette.

- 1 Switch on the TV set. If required, select the programme number for the video recorder.
- 2 Press **[MENU]** on the remote control. The main menu will appear.

- 3 Select the line 'RECORD SPEED' with **[-P+]** or **[+P+]** and confirm with **[OK]**.

- 4 Select the required recording speed with **[←]** or **[→]**.

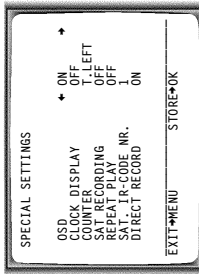
- ⚠ 'LP': Long Play = half recording speed (double recording time).
 - 'SP': Standard Play = normal recording speed.
 - 'AUTO': AUTOMATIC Long Play
- If there is not enough space on the tape to record a programmed recording in standard speed, the recording will automatically be made in 'LP' (Longplay). Otherwise, the recording speed will be 'SP' (Standardplay).

- 5 Confirm with **[OK]**.
 - 6 To end, press **[MENU]**.
- ⚠ The picture quality will be adversely affected when recording at half recording speed ('LP').
 - ⚠ For playback, the correct recording speed will automatically be selected.

Automatic recording from a satellite receiver (SAT RECORDING)

You can only use this function, when you have a satellite receiver which can control other equipment by a 'programming' function.

- 1 Switch on the TV set. If required, select the programme number for the video recorder.
- 2 Press **[MENU]** on the remote control. The main menu appears.
- 3 Select the line 'SPECIAL SETTINGS' with **[-P+]** or **[+P+]**, and confirm with **[OK]**.



- 4 Select the line 'SAT RECORDING' with **[-P+]** or **[+P+]**.
 - 5 Select 'ON' with **[←]** or **[→]**.
- ⚠ If you want to switch off the function, select 'OFF'.

- 6 Confirm with **[OK]**.
 - 7 To end, press **[MENU]**.
 - 8 Put a cassette in the machine.
 - 9 Use a scart cable to connect scart socket **[AV2EXT2]** on the video recorder to the corresponding scart socket on the satellite receiver.
 - 10 Programme the satellite receiver with the required information (programme number of the TV channel, start time, end time).
- ⚠ The information on how to programme your satellite receiver can be found in the instruction manual of your satellite receiver.

- 11 Switch off the video recorder with **[STANDBY/ON]**.
- The video recorder is now ready to record. The beginning and end of the recording is controlled via scart socket **[AV2EXT2]**.
- ⚠ If this function is switched on 'S' will appear on the video recorder display.

'Direct Record'

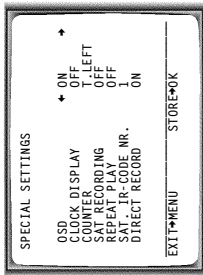
With this function, the video recorder will automatically record the programme selected on the television by means of a scart cable. **The video recorder must be switched off.**

- ⚠ You can only use this function if your TV is suitable for 'Easy Link'.
This is how you switch the function off:
- ⚠ You will find more information on how to switch 'Direct record' on or off in the next section 'Direct record'.

- 1 On the TV set, select the programme number you want make the recording from.
- 2 Press **[RECORD]**.
- 3 If you want to stop recording, press **[STOP]**.

Switching 'Direct Record' on or off

- 1 Switch on the TV set and select the programme number for the video recorder.
- 2 Press [MENU] on the remote control. The main menu will appear.
- 3 Select the line 'SPECIAL SETTINGS' with [-P+] or [TP+], and confirm with [OK].
- 4 Press [MENU]. The main menu appears.
- 5 Select the line 'SPECIAL SETTINGS' with [-P+] or [TP+], and confirm with [OK].



- 4 In the line 'DIRECT RECORD', select the function 'OFF' with [-] or [-].
- 5 If you select 'ON', the function will be switched on.
- 6 If 'N. ACT.' appears in the line 'DIRECT RECORD', you cannot select the function 'Direct record'.
- 7 Confirm with [OK].
- 8 To end, press [MENU].
- 9 Switch off with [STANDBY/ON].

IR control system with the Sat Mouse

With the Sat Mouse, your video recorder can select broadcasts you receive on your Set Top Box. You will need the Sat Mouse function to programme a TV channel that you can only receive on your satellite receiver. A list of Set Top Boxes that can be controlled with the Sat Mouse is printed at the end of this section.

Connecting your Sat Mouse

- 1 Connect the Sat Mouse to the [IR-SAT] socket at the back of your video recorder.
- 2 Place the Sat Mouse on the Set Top Box and make sure that the infrared signal, which is transmitted from the bottom side of the Sat Mouse, is not blocked.

IR-CODE table

TYPE	MODELL	IR-CODE NR
ASTON	Xena 1500	8,13
CANAL+	Canalsatellite	1
EUROSTAR	D-2500-IP	11
GRUNDIG	Digibox GDS 200/1	3
HUMAX	FI-AVCI	2
NOKIA	D-BOX	5
NOKIA	9200S	5
NOKIA	9800S	6
NOKIA	9850 T	6
PAGE	DIR730 IM	12
PAGE	BSKYB 2200	3
PHILIPS	TU-DSB 30	3
PHILIPS	DTX 6371	4
PHILIPS	BGI/188B/196	4
SAGEM	ISD 3100	10, 14
SAGEM	ISD 3200	10, 14
TPS	Thomson	10, 14
TPS	Sagem	10, 14
XCOM	CDTV200	7
XCOM	CDTV350	9

6. PROGRAMMED RECORDING (TIMER)

Use programmed recording to automatically start and stop a recording at a later date.

To make a programmed recording, your video recorder needs to know:

- * the date you want to make the recording;
- * the programme number for the TV channel you want to record;
- * the start and stop time of the recording;
- * whether you want to use VPS or PDC

The video recorder stores all the information in a TIMER block. You can programme up to 6 TIMER blocks a month in advance.

'VPS' (Video Programming System) and 'PDC' (Programme Delivery Control)

With VPS or PDC, the TV station controls the start time and the length of the recording. This means that the video recorder switches itself on and off at the **right time** even if a TV programme you want to record begins earlier or finishes later than expected.

Usually the start time is the **same** as the VPS or PDC time. But if your TV guide gives a VPS or PDC time which is different to the programme's start time (for example, 20.15 and VPS 20.14), you must enter '20.14' as the start time.

If you want to programme a time that is different from the VPS or PDC time, you must switch off VPS or PDC.

⚠ In the United Kingdom, only PDC will be available.

Programming a recording (with 'ShowView')

All the important information needed for a programming is contained in the ShowView-programming number.



1 Switch on the TV set and select the programme number for the video recorder.

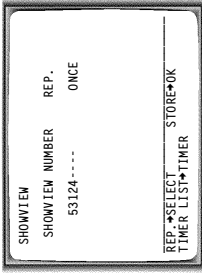
2 Press [TIMER] on the remote control.

3 Enter the entire ShowView programming number (up to 9 digits) printed in your TV guide next to the start time of a TV programme.

For example, 5-312-4 or 5 312 4

Enter 53124 for the ShowView programming number.

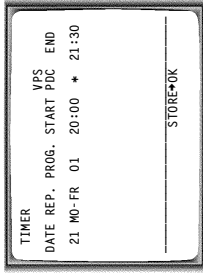
⚠ If you make a mistake, you can clear your instructions with [CLEAR].



4 Use [SELECT] to select daily or weekly programming.

'ONCE': Recording once
'MO-FR': Recordings every day from Monday to Friday.
'WEEK.': Recordings every week on the same day of the week.

5 Confirm with [OK]. Your programming details will then appear on the TV screen.



⚠ If ShowView Deluxe does not recognise the TV channel, 'SELECT PROG. NR.' will appear on the TV screen. Select the desired programme number (or channel name) with the number buttons [0-9] on the remote control and confirm with [OK].

⚠ If you are using a Sat Mouse and you want to enter a satellite programme number, press [SELECT]. Make sure that your Sat Mouse has been connected properly (see chapter 'RECORDING', section 'IR control system with the Sat Mouse', connecting the Sat Mouse). Enter the satellite programme number for the TV channel you want to programme with the number buttons [0-9] on the remote control.

⚠ If 'SHOWVIEW NUMBER NOT VALID' appears on the TV screen, this means you entered an incorrect ShowView Deluxe code number or the incorrect date for the recording. The start of the programmed recording must be within tREACT next 7 days.

⚠ Correct your instructions or end with [TIMER].

⚠ If 'MO-FR PROGRAMMING NOT POSSIBLE FOR WEEKEND' appears on the TV screen, you have programmed a the wrong day for the daily recording. Daily programming can only be used for recordings to be made from Monday to Friday.

⚠ Under 'START', use [SELECT] to switch 'VPS/PDC' on or off. If '*' appears on the screen, the function has been switched on.

⚠ If you have programmed a satellite channel, you cannot use 'VPS/PDC' for this TV channel.

6 Confirm with [OK] when the information is correct.

⚠ The programming information has been stored in a TIMER block.

7 Make sure that the cassette you have put in can be recorded on.

8 Switch off with [STANDBY/ON].

The programmed recording will only function when the video recorder is **switched off** with [STANDBY/ON].

⚠ If any of the TIMER blocks are in use, 'o' will light up on the video recorder display.

⚠ While a programmed recording is being made, you cannot operate your video recorder manually. If you want to cancel the programmed recording, press [STANDBY/ON].

⚠ If the video recorder is switched on a few minutes before a programmed recording is supposed to begin, 'SWITCH TO STANDBY - TIMER RECORDING' will flash on the TV screen.

⚠ If you reach the end of the cassette during a recording, the video recorder will automatically eject the cassette.

⚠ If you forget to load a cassette, 'NO CASSETTE' will appear on the TV screen and 'o' will flash on the video recorder display.

⚠ If you have put in a cassette which cannot be used for recording, the video recorder will automatically eject it.

⚠ If 'ALL TIMERS OCCUPIED' appears on the TV screen when you press [TIMER], you have used up all the available TIMER blocks. If you want to clear or check a TIMER block, select it with [P+] or [P-].

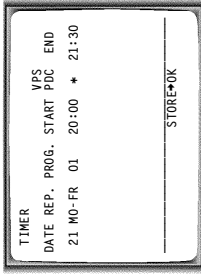
⚠ Programme numbers 'E' and 'E2' are for recordings from other sources (through scart socket [AVTEXT] or [AVEXT2]).

Programming a recording (without 'ShowView Deluxe')

1 Switch on the TV set and select the programme number for the video recorder.

2 Press [TIMER] on the remote control **twice**. The free TIMER block will be highlighted.

3 Press [TIMER]. The information will appear on the screen.



4 With [TIMER], [P+] or [P-] you can select 'DATE' (date), 'PROG.' (programme number), 'START' (start time) and 'END' (end time).

Enter or change your information with [P+] or [P-], or with the number buttons [0-9].

⚠ Under 'DATE', use the [SELECT] button to select daily or weekly programming.

'ONCE': Recording once

'MO-FR': Recording from Monday to Friday.

'WEEK.': Recording every week on the same day.

⚠ If you are using a Sat Mouse and you want to enter a satellite programme number, press [SELECT] in line 'PROG.'. Make sure that your Sat Mouse has been connected properly (see chapter 'MANUAL RECORDING', section 'IR control system with the Sat Mouse', connecting the Sat Mouse).

On the screen, for instance, 'S---' will appear on the screen. Enter the satellite programme number for the TV channel you want to programme with the number buttons [0-9] on the remote control.

Programming a recording with 'TURBO TIMER'

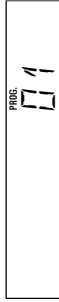
With the 'TURBO TIMER', programming a recording that takes place within the next 24 hours, will be quick and easy. This preset information will appear in the display:

- Programme number = the programme number selected on your TV
- Start time = current time
- End time = current time + 2 hours

1 Press **[TURBO TIMER]** on the remote control.

2 Press **[TURBO TIMER]**.

The currently selected programme number will appear in the display, for instance, 'PROG. 01'. If required, change the programme number with **[←P+]** or **[↑P+]**.



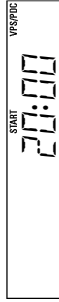
⚠ If 'E.L.K.' briefly appears in the display, you must set the clock. Please read the section 'Setting the time and date' in chapter 'INSTALLING YOUR VIDEO RECORDER'.

⚠ If you are using a Sat Mouse and you want to enter a satellite programme number, press **[SELECT]**. Make sure that your Sat Mouse has been connected properly (see chapter 'MANUAL RECORDING', section 'IR control system with the Sat Mouse', 'connecting the Sat Mouse'). In the video recorder display 'MANUAL RECORDING' will appear.

Enter the satellite programme number for the TV channel you want to programme with the number buttons **[0-9]** on the remote control.

3 Press **[TURBO TIMER]**.

The current time (= start time) will appear in the display, for instance, 'START 20:00'. If required, change the start time with **[←P+]** or **[↑P+]**.



⚠ Switch 'VPS/PDC' on or off with **[SELECT]**. In the display, 'VPS/PDC' lights up (switched on) or disappears (switched off).

⚠ If you have programmed a satellite channel, you cannot use 'VPS/PDC' for this TV channel.

⚠ Under 'START', use **[SELECT]** to switch 'VPS/PDC' on or off. If '*' appears in the display, 'VPS/PDC' has been switched off. If you have programmed a Set Top Box channel, you cannot use 'VPS/PDC' for this TV channel.

5 Confirm with **[OK]** when the information is correct.

⚠ The programming information has been stored in a TIMER block.

6 Make sure that the cassette you have put in can be recorded on.

7 Switch off with **[STANDBY/ON]**.

The programmed recording will only function when the video recorder is **switched off** with **[STANDBY/ON]**.

⚠ If any of the TIMER blocks are in use, 'o' will light up on the video recorder display.

⚠ While a programmed recording is being made, you cannot operate your video recorder manually. If you want to cancel the programmed recording, press **[STANDBY/ON]**.

⚠ If you reach the end of the cassette during a recording, the video recorder will automatically eject the cassette.

⚠ If you have put in a cassette that cannot be recorded on, the cassette will be ejected. 'PROTECTED CASSETTE' will briefly appear on the TV screen.

⚠ If the video recorder is switched on a few minutes before a programmed recording is to start, 'SWITCH TO STANDBY - TIMER RECORDING' will flash on the TV screen.

⚠ If you forget to put a cassette in the machine, 'NO CASSETTE' will appear on the TV screen. 'o' will flash in the video recorder display.

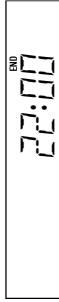
⚠ If 'ALL TIMERS OCCUPIED' appears on the TV screen when you press **[TIMER]**, you have used up all the available TIMER blocks. If you want to clear or check a programmed recording (TIMER block), select it with **[↑P+]** or **[←P+]**.

⚠ If 'DATA ERROR' briefly appears on the screen, this means that the TIMER information has not been transferred. Please check date, start time and end time of the programmed recording.

⚠ Programme numbers 'E' and 'E2' are for recordings from other sources through scart socket **[AV EXT1]** or **[AV EXT2]**.

4 Press **[TURBO TIMER]**.

The end time will appear in the display, for instance, 'END 22:00'. If required, change the end time with **[←P+]** or **[↑P+]**.



5 Press **[TURBO TIMER]**.

'E.L.K.' will briefly appear in the video recorder display. Programming is now complete.

6 Make sure that the cassette you have put in can be recorded on.

7 Switch off with **[STANDBY/ON]**.

The programmed recording will only function when the video recorder is **switched off** with **[STANDBY/ON]**.

⚠ If any of the TIMER blocks are in use, 'o' will light up on the video recorder display.

⚠ While a programmed recording is being made, you cannot operate your video recorder manually. If you want to cancel the programmed recording, press **[STANDBY/ON]**.

⚠ If you reach the end of the cassette during a recording, the video recorder will automatically eject the cassette.

⚠ If you forget to load a cassette, 'E.P55' will briefly appear in the display and then 'o' will flash in the video recorder display.

⚠ If you have put in a cassette which cannot be used for recording, the video recorder will automatically eject it.

⚠ If 'FULL' appears in the display when you press **[TURBO TIMER]**, you have used up all the available TIMER blocks. You can find more information on how to clear or check a programmed recording (TIMER block) in the next chapter.

How to check or change a programmed recording (TIMER)

1 Switch on the TV set and select the programme number for the video recorder.

2 Press **[TIMER]** on the remote control **twice**.

3 Select the programmed recording (TIMER) you want to check or change with **[←P+]** or **[↑P+]**.

4 Press **[TIMER]**.

5 Select the entry field with **[←]** or **[→]**.

6 Change any information with **[←P+]** or **[↑P+]** or with the **[0-9]** number buttons.

7 Confirm with **[OK]**.

8 Make sure that the cassette you have put in can be recorded on. Switch off with **[STANDBY/ON]**.

⚠ The programmed recording will only function when the video recorder is **switched off** with **[STANDBY/ON]**.

How to clear a programmed recording (TIMER)

1 Switch on the TV set and select the programme number for the video recorder.

2 Press **[TIMER]** on the remote control **twice**.

3 Select the programmed recording (TIMER) you want to clear with **[←P+]** or **[↑P+]**.

4 Press **[CLEAR]**.

The programmed recording (TIMER) has now been deleted.

5 To end, press **[MENU]**.

'NexTVview Link'

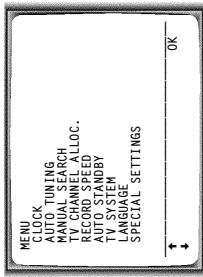
This video recorder is equipped with the function 'NexTVview Link'. If your television is also equipped with this function, you can mark TV programmes on the television for programming. These TV programmes will automatically be transmitted to a TIMER block on the video recorder. If you clear the marking of the TV programme on the television, the corresponding TIMER block on the video recorder will also be cleared. For more information, read the instruction manual of your TV set.

7. ADDITIONAL FUNCTIONS

Switching the TV system

If you play recordings made on another video recorder or if you record from another source, the automatic TV system switch-over may lead to colour distortion. You can switch off the automatic TV system switch-over as follows.

- 1 Press **[MENU]** on the remote control **before you start recording or during playback**. The main menu will appear.



- 2 Select the line 'TV SYSTEM' with **[←]** or **[→]** and confirm with **[OK]**.
- 3 Select the TV system with **[←]** or **[→]**.
Select 'B/W' with **[→]** or **[←]** to switch to black and white picture.
- 4 Confirm with **[OK]**.
- 5 To end, press **[MENU]**.
- 6 If you change the programme number, the video recorder will switch to 'AUTO' (automatic switchover) again.
- 7 If you eject the cassette, the TV-system for playback will switch to 'AUTO' (automatic switchover) again.

Child lock

This function will prevent unauthorised use of your video recorder. All button-functions will be locked.

- △ You can make programmed recordings while the child lock is on.

- 1 With the video recorder switched on, press **[CHILD LOCK]** on the remote control for **five seconds**.
'ON' will appear on the video recorder display. Keep the remote control in a safe place.

- 2 If you want to switch off the child lock, press **[CHILD LOCK]** again for **five seconds**, with the video recorder switched on.

The symbol 'ON' will disappear from the video recorder display.

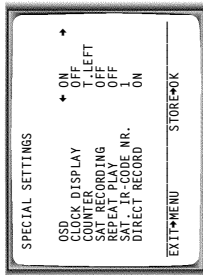
- △ If you press a button when the child lock is on, the symbol 'ON' will flash on the video recorder display for a few seconds.

Switching the on-screen display (OSD) off or on

You can switch the on-screen display of the current operating information on or off.

Switching off the on-screen display is necessary if you do not want to record the screen-messages when copying cassettes.

- 1 Switch on the TV set and select the programme number for the video recorder.
- 2 Press **[MENU]** on the remote control. The main menu will appear.
- 3 Select the line 'SPECIAL SETTINGS' with **[←]** or **[→]** and confirm with **[OK]**.



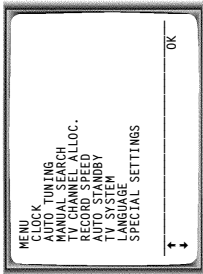
- 4 In the line 'OSD', select one of the options shown with **[←]** or **[→]**.
'ON': Shows the OSD for a few seconds only.
'OFF': Switches off the OSD.
- 5 Confirm with **[OK]**.
- 6 To end, press **[MENU]**.

Switching the remote control command

If you have two video recorders with the same remote control command, you can change the remote control command of the remote control for one of the video recorders.

- 1 Switch on the TV set and select the programme number for the video recorder.

- 2 Press **[MENU]** on the remote control. The main menu will appear.



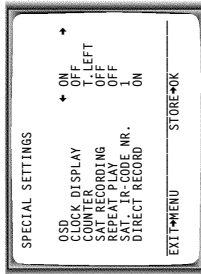
- 3 On the remote control, press **[SELECT]** and button **[2]** at the same time, to switch the remote control to 'VCR2'.
△ If you want to switch back to 'VCR1', press **[SELECT]** and button **[1]** at the same time.

- 4 Confirm with **[OK]**.
If you have switched the remote control and the video recorder to 'VCR2', 'RESPONDS TO VCR2' will appear on the TV screen.
△ If the menu does not disappear, the video recorder didn't recognise the remote control command.
Repeat step **3**.
△ If you change the batteries of the remote control, it will switch back to 'VCR1'.
△ If the message, for example, 'VCR2' appears on the video recorder display, you must switch the remote control to 'VCR2'.

Continuous playback

You can automatically play a cassette again and again. When the video recorder reaches the end of the tape or the end of the recording, it will rewind and start again.

- 1 Press **[MENU]** on the remote control. The main menu will appear.
- 2 Select the line 'SPECIAL SETTINGS' with **[←]** or **[→]** and confirm with **[OK]**.



- 3 Select the line 'REPEAT PLAY' with **[←]** or **[→]**.
- 4 Select 'ON' with **[←]** or **[→]**.
△ If you select 'OFF', continuous playback will be switched off.
- 5 Confirm with **[OK]**.
This will appear on the screen: 'STORED'
- 6 Press **[MENU]**.
- 7 Put a cassette in the machine.
- 8 Press **[PLAY]** to start continuous playback.

Automatic switch-off

If you haven't used the video recorder for a few minutes in certain modes (e.g.: STOP), it will switch to standby automatically. You can cancel this function to use the video recorder as a television receiver.

- 1 Switch on the TV set and select the programme number for the video recorder.
- 2 Press **[MENU]**. The main menu will appear.
- 3 Select the line 'AUTO STANDBY' with **[←]** or **[→]** and confirm with **[OK]**.
- 4 Select 'OFF' with **[←]** or **[→]**.
△ If you select 'ON', the function will be switched on.
- 5 Confirm with **[OK]**.
This message will briefly appear: 'STORED'
- 6 To end, press **[MENU]**.
△ A **TIMER recording** only works when the video recorder is **switched to standby**.

Reducing picture disturbance - optimizing the modulator

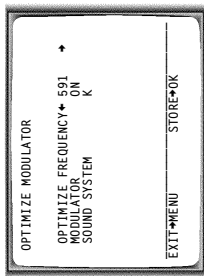
You may experience picture disturbance if you have not used a scart cable to connect your video recorder and TV. This is because another TV station in your reception area may already be using UHF-channel CH36 or 591MHz. When the video recorder is switched on, the picture quality of some TV channels received on the TV is poor.
You may optimize the picture quality by changing the modulator frequency (591Mhr or UHF channel 36).

⚠ If the selected code does not work with your TV set, or if the make of your TV is not in the list, you can try out the codes one after the other.

1 Switch on the TV set and select the programme number for the video recorder.

2 Make sure that there is **no** cassette in the video recorder.

3 Press **[STOP/EJECT]** on the video recorder and **[STOP]** on the remote control **at the same time** for several seconds, until, for example, "MSG" appears on the video recorder display.



4 Select the line 'MODULATOR' on the TV screen or 'MSG' in the display with **[P+]** or **[P-]**.

5 With **[←]**, select the function 'OFF' on the TV screen or 'MSG' (modulator off) in the display.

⚠ If you want to switch the modulator on again, select 'MSG' (modulator on) in the video recorder display with **[←]**.

6 Confirm with **[OK]**.

7 To end, press **[MENU]**.

Using your video recorder remote control with your TV set

Your video recorder remote control can transmit several commands to TV sets of different makes.

By using the **TV** buttons on the panel in the middle of the control, you can:

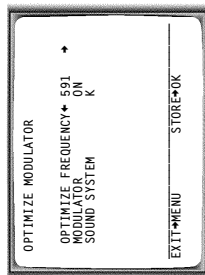
- [VOLUME+]** increase the TV volume
- [VOLUME-]** reduce the TV volume
- [TV MUTE]** switch off sound
- [TV CH+]** switch off the TV set
- [TV CH-]** next programme number
- [TV PREV]** previous programme number

1 Hold **[TV CH+]** and enter the correct remote control command with the number buttons **[0-9]**. You will find a list of all available remote control commands on the last page of this manual.

1 Switch on the TV set and select the programme number for the video recorder playback (see your TV operating manual).

2 Make sure that there is **no** cassette in the video recorder.

3 Hold **[STOP]** on the remote control and **[STOP/EJECT]** on the video recorder at the same time, until, for instance, "MSG" appears in the display. The video recorder transmits a test picture on UHF-channel 36 or frequency 591 mhz.



4 Select the line 'OPTIMIZE FREQUENCY' with **[P+]** or **[P-]**. Enter the Modulator frequency with the number buttons **[0-9]**.

⚠ Press **[→]**. The automatic channel search starts. When the video recorder finds a 'free' channel, the frequency of this channel will be shown in the display.

5 Tune in the TV set to the new modulator frequency shown in the video recorder display.

⚠ If the picture or sound quality is poor, you may have selected the wrong TV system.

In the line 'SOUND SYSTEM' select the required TV system, for instance, 'G' (for TV-system PAL-B,G) or 'K' (for TV-system SECAM-D,K) using **[→]** or **[←]**.

6 Confirm with **[OK]**. 'OK' will briefly appear in the video recorder display.

Optimizing the modulator is now complete.

Switching off the modulator

If you cannot clear picture or sound interference, you can switch off the built-in modulator. You can only switch off the modulator if you have connected the video recorder to the TV set with a scart cable. Connecting VCR without scart cable is not possible when the modulator is switched off.

⚠ With the function 'Connecting with scart cable and Easy link' the modulator will be switched off automatically.

8. Before you call an engineer

If, contrary to expectation, you have any problems using this video recorder, it may be caused by one of the reasons mentioned below. You can also call the **customer service centre** in your country.

You will find the phone number in the enclosed guarantee leaflet. Be prepared to give the model and production number to the customer service. Have the model number (MODEL NO) and the production number (PROD.NO) of your video recorder ready.

Your video recorder does not respond to any button being pressed:

- There is no power supply; check the power supply.
- A programmed recording is currently being made; if desired, cancel the programmed recording with **[STANDBY/ON/OFF]**.
- Child lock is on; switch the child lock off.
- There is a technical problem: switch off the mains power supply for 30 seconds, then switch it on again. If this does not have any effect, you can:
 1. Switch off the mains power supply again.
 2. Then switch it on **whilst holding down [STANDBY/ON/OFF]** on the video recorder.
 3. Release the button when 'OSD' appears in the video recorder display. All the information stored (TV channels, time and date, TIMER) will be cleared.

Cassette is jammed in the video recorder:

- Don't use force. Pull out the mains plug for a moment.

Remote control does not work:

- Remote control not pointed toward the video recorder; point it at the video recorder.
- There is a technical problem: Take out the batteries, wait for 10 seconds and place them back.
- Batteries have run out: change the batteries.
- The remote control command is wrong: read 'Switching remote control command' in the chapter 'Additional functions'.

No picture when you play a cassette:

- There is no recording on the cassette; change the cassette.
- You have selected the wrong programme number on the TV for playing cassette: on the TV, select the correct programme number for the video recorder.
- The cable connecting the TV set and the video recorder has come loose; check the cable.

Poor picture quality when you play a cassette:

- Your TV set is not properly adjusted.
- The cassette badly worn or of poor quality; use new cassette.
- Tracking is not properly adjusted: turn to chapter 'PLAYBACK FUNCTIONS' and read the section 'Tracking during playback'.
- Read the section 'Selecting the picture settings (SMART PICTURE)' in the chapter 'PLAYBACK FUNCTIONS'.

The video recorder will not record:

- The TV channel you want to record is not stored or you selected the wrong programme number: check TV channels stored.
- You have loaded a cassette which cannot be recorded on: undo the erase protection on the cassette.

Programmed recording does not work:

- You have not set the TIMER properly; check the TIMER blocks.
- You have programmed the wrong time or date: check time and date.
- You have put in a cassette that cannot be recorded on: undo the erase protection on the cassette.
- VPS/PDC switched on but VPS/PDCtime' wrong: enter VPS/PDCtime exactly to the minute. Have your aerial checked.
- You have programmed a recording with ShowView Deluxe, but the programme number information of the TIMER block is not the programme number you want to record from:
 1. Confirm the ShowView programming number with **[OK]**.
 2. Press **[TIMER]**.
 3. Change the programme number displayed in the 'PROG.' entry field.
 4. Confirm with **[TIMER]**.

There is picture or sound interference on TV reception:

- Turn to chapter 'ADDITIONAL FUNCTIONS' and read 'Reducing picture disturbance - optimizing the modulator' and 'Switching off the modulator'.
- Have your aerial checked.

9. GLOSSARY

Technical terms used

Current tape position

The part of the tape currently being played.

External source

A device connected via a socket (for example, scart socket) which is transmitting audio/video signals to the video recorder.

The largest possible display area for the video recorder - the screen on your television set.

Index marking

A marking which is automatically made on the tape at the beginning of every recording. This marking (recording ID) can be searched for with the Index search function.

Scart cable

Also known as a Euro-AV cable. This standard cable is an easy method of connecting various audio and video devices, computer screens and televisions. Other signals in addition to audio and video signals can be transmitted on it.

TV system

There are various systems for transmitting television signals, for example, PAL, SECAM, PAL BG, SECAM DK, SECAM L/L, NTSC etc. The system used by your television depends on which country you are in.

TXI

Also known as Teletext; Fasttext; Videotext; FLOF etc.

OTR

One touch recording (to start recording by pushing just one button). This function enables you to select the switch-off time in intervals of 30 minutes.

Modulator

An electronic component in a video recorder which allows audio and video signals to be transmitted via the aerial cable. Your television receives the signal in the same way as a signal from a television station.

Modulator channel or frequency

This frequency or channel indicates the frequency or channel on which the audio or video signal is transmitted.

UHF frequency range

Channels 21 to 69. The video recorder 'broadcasts' on channel 36/frequency 591 MHz. This frequency or channel can be changed. See the section 'Reducing picture disturbance - optimizing the modulator'.

OSD (On-screen display)

The largest possible display area for the video recorder - the screen on your television set.

Remote codes

Acura	02	GoldStar	15, 20, 27	Proline	31
Adyson	05, 20	Goodmans	07, 10, 20, 29, 36	Protech	02, 12, 20, 23, 25, 38
Akai	18, 33	Gorenje	35	Quelle	03, 04, 33
Akura	21, 25	Graetz	33	Questa	07
Alba	02, 07, 21	Granada	10, 18, 20	Rank Arena	07
Allorgan	28	Grandin	26	Rediffusion	33
Amplivision	20	Grundig	17	Rex	25
Amstrad	02	HCM	02, 26	Roadstar	02, 21, 25, 38
Anitech	02	Hanseatic	01, 30, 33	SEG	07, 20, 25
Arcam	19, 20	Hinari	02, 07, 21	SEI	12, 28
Asuka	21	Hisawa	26	Saba	15
Audiosonic	15	Hitachi	05, 07, 08, 13, 15, 20, 22	Saisho	02, 04, 25
BPL	26	Huanyu	19, 36	Salora	33
BSR	28	Hypson	25, 26	Sambers	12
BTC	21	ICE	20, 25	Samsung	01, 02, 20, 25, 27, 35
Basic Line	02, 21	ICeS	21	Sandra	19
Baur	03, 33	ITT	33	Sanyo	04, 07, 10, 18
Beko	35	Imperial	23, 35, 38	Schaub Lorenz	33
Binatone	20	Inno Hit	10	Schneider	21, 23, 37
Blaupunkt	17	Interfunk	23, 33	Sei-Sinudyne	03
Blue Sky	21	Intervision	12, 20, 25	Sentra	06
Blue Star	26	Isukai	21	Sharp	07, 11
Bondstec	23	JVC	07, 09	Shorai	28
Boots	20	Kaisui	02, 19, 20, 21, 26	Siarem	12
Brandt	15	Kathrein	01	Siemens	17
Britannia	19	Kingsley	19	Silver	07
Bush	02, 07, 21, 26, 28, 36	Koyoda	02	Sinudyne	12, 28
CGE	23	Leyco	10, 25, 28	Solavox	05
CS Electronics	19	Lloytron	05	Sonitron	18
CTC	23	Luxor	33	Sonoko	02
Carrefour	07	M Electronic	02, 13, 15, 20, 32, 36, 41	Sonolor	18
Cascade	02	Magnadyne	12, 23	Sony	03, 04, 07
Cimline	02	Magnafon	12	Soundwave	38
Clatronic	23, 35	Manesth	20, 25, 30	Standard	02, 20, 21
Condor	30, 35	Marantz	01	Sunkai	28, 31
Contec	02, 07, 19	Matsui	02, 04, 06, 07, 10, 18, 20, 28	Susumu	21
Crown	02, 35, 38	Memorex	02	Tandy	10, 20, 21
Cybertron	21	Metz	34	Tashiko	07, 20
Daewoo	02, 36	Mitsubishi	07, 14, 16	Tatung	10, 20
Dainichi	21	Mivar	19, 27	Tec	20, 23
Dayton	02	Multitech	02, 12, 19	Technema	30
De Graaf	18	Neckermann	01	Technics	24
Decca	10	Nikkai	05, 06, 10, 19, 21, 25	Telefunken	15
Dixi	02	Nobliko	12	Telemeister	30
		Nokia	33, 41	Teletech	02
Dual Tec	20	Nordmende	15	Teleton	20
Elite	21, 30	Oceanic	33	Tensai	21, 28, 29, 30
Elta	02	Orion	28, 30, 31	Textet	19, 21
Emerson	33	Osaki	05, 10, 20, 21, 25	Thomson	15
Ferguson	15	Oso	21	Thorn	06, 10, 33
Fidelity	19, 33	Osume	05, 10	Tomashi	26
Finlandia	18, 32	Otake	29	Toshiba	06, 07
Finlux	10, 13, 32	Otto Versand	01, 03, 07, 20, 30	Uher	30
Firstline	02, 19, 20, 23, 28, 31	Palladium	35, 38	Ultravox	12
Fisher	18, 20, 35	Panama	20, 25	Universum	13, 25, 32, 35
		Panasonic	24, 34	Videosat	23
Formenti	30	Pathe Cinema	19, 30	Videotechnic	20
Frontech	23, 25	Pausa	02	Visa	02
Fujitsu	10	Perdio	30	Vision	30
Funai	25, 28	Phase	05	Waltham	20
GEC	10, 20	Philco	23	Watson	30
GPM	21	Philips	01, 36	Watt Radio	12
Geloso	02	Pioneer	15	Wega	07
Genexxa	21	Profex	02, 33	White Westinghouse	19, 30
				Yoko	20, 25

4. Dismantling instructions

4.1 Dismantling instructions

General guidelines for dismantling housing components, electronic parts and the drive mechanism

Always disconnect from mains before dismantling or assembly.

Due to the supply voltages (hot circuit) on the primary side of the switched-mode power supply, an isolating transformer is required for the operation of the device.

The drive or the drive/motherboard unit must not be pulled out by the cross struts!

Components placed below the tape deck has to be inserted exactly.

The use of a regulating isolating transformer is recommended for detecting faults around the power supply.

All screws of the video recorder can be removed or tightened with a 10* torx screwdriver .

1. Housing cover (Figure 4-1)

- Remove the four screws (A).
- Push catch (S) inwards, lifting lid at the same time to move out of groove.
- Slide housing cover back by approx. 1 cm.
- Push centre of housing cover sides on underside approx. 1 cm outwards and lift up the housing cover.

Assembly

Assemble in reverse order.

2. Base plate (Figure 4-2)

The base plate may not be removed from the frame!

3. Front panel (Figure 4-2)

Preparation

Dismantle the housing lid as described in section 1.

- Position the device with the base plate facing upwards.
- Undo the six catches (S) one after the other, starting from the left or the right.
- Remove the front panel by pulling it forwards.
- For devices with shuttle print or socket print, disconnect the cabling to the motherboard.

Assembly

Assemble in reverse order (device in operational position).

Important

- The lift flap lever should be connected to the lift flap guide.
- Check that all catches are engaged.

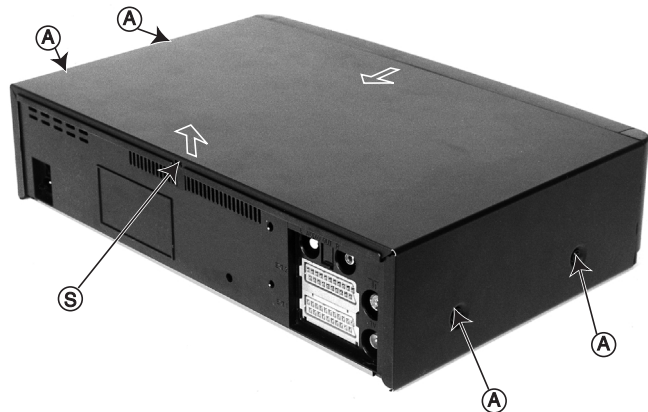


Figure 4-1

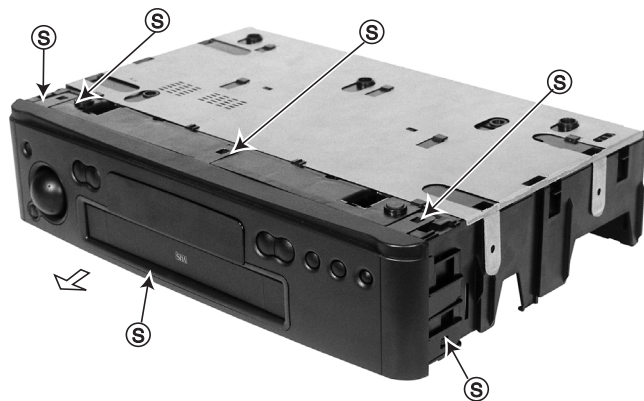


Figure 4-2

4.2 Dismantling of the motherboard/drive combination (Figure 4-3 and 4-4)

Preparation

Remove the housing cover as described in section 1.
Remove the front panel as described in section 3.

- Move device into operational position (Figure 4-3).
 - Undo the two screws (B) of the stay and pull it up to remove it.
 - Push back the lift by 5 cm after releasing both lift stops.
 - Undo and remove the four fastening screws (C) of the drive.
 - Detach the Cinch socket cable (K) and ground cable (M) from the socket print (if present).
 - Remove the cables (K1; K2; K3) from the guides on the rear of the frame.
 - Pull the Cinch socket holder with the socket and print up and out of the frame (if present).
 - Position the device with the base plate facing up.
 - Undo the 8 catches (S) from the rear right to the rear front and then from the rear left to the front left.
 - After the weight of the motherboard/drive unit has released it from the frame, the catch (S) at the mains socket has to be released for a second time.
 - The frame can be removed by lifting it off.
 - Turn the motherboard/drive unit and move it into the service position (Figure 4-6), if necessary.
 - The device is operational in this position
- "Eject" must NOT be used !!!**

Caution:

Adjustments can not be made in the service position.
"Eject" must NOT be used !!!

Assembly

- Position the frame with the top open onto a level surface.
 - Hold the drive on the side at the lift and insert the motherboard/drive unit into the frame, pushing it down lightly. Observe that the power Supply and Scart sockets are positioned in openings.
 - Check that all 8 catches (S) are engaged.
 - Secure the drive with the four holding screws (C).
 - Move the lift into the "Eject" position.
 - Push the stay onto the frame with the chamfered side facing to the rear and secure with both screws (B).
 - Insert the Cinch socket into the opening and ensure that it engages.
 - Connect the Cinch socket and the ground cable (K ; M) (if present).
- **Insert the cables (K1; K2; K3) into the supports provided in the frame.**
 - Replace the front panel and the housing cover.

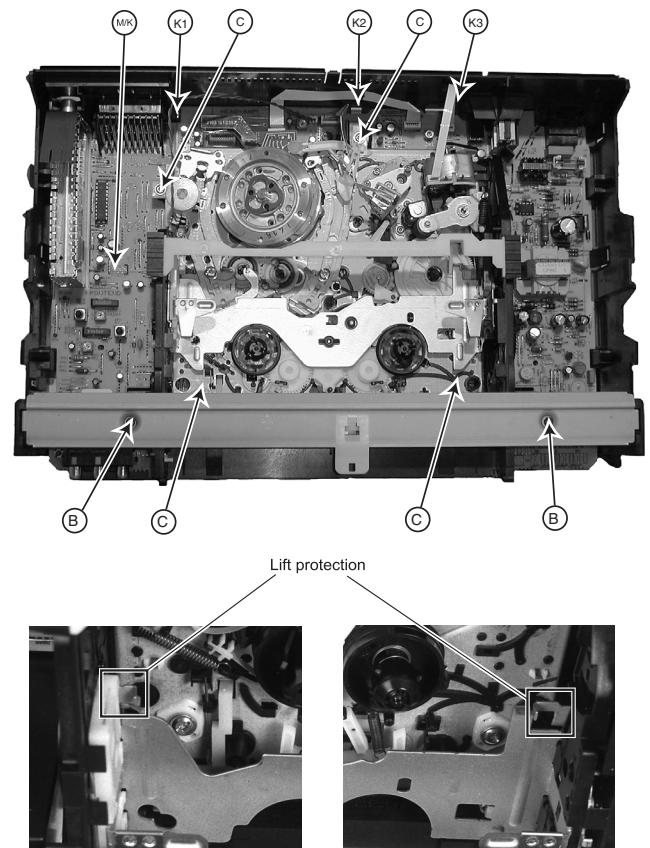


Figure 4-3

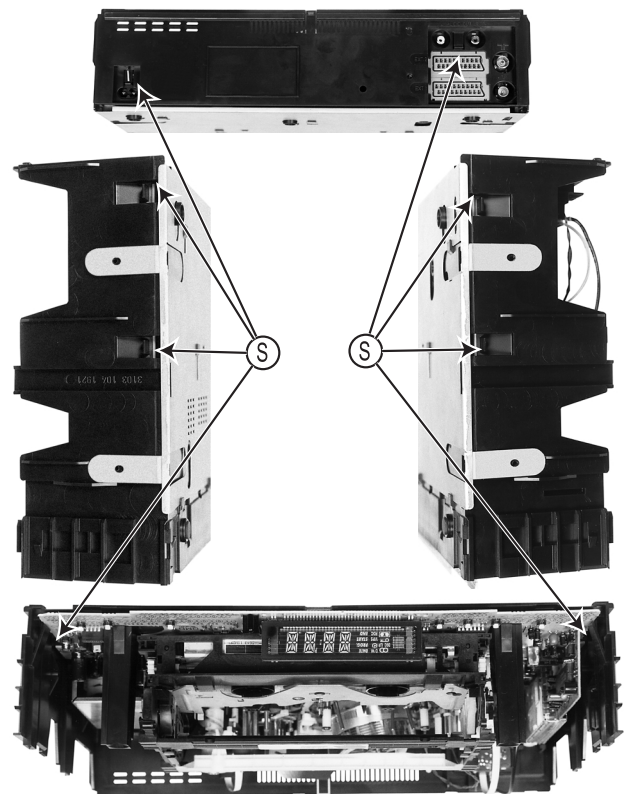


Figure 4-4

4.3 Dismantling the drive (Figure 4-3, 4-5 and 4-6)

Preparation

Remove the housing cover as described in section 1.

Remove the front panel as described in section 3.

- Undo the two screws (B) of the stay and pull it up to remove it.
- Push back lift by 5 cm after releasing both lift stops.
- Undo and remove the four fastening screws (C) of the drive.
- Undo and remove the ground screw (D) at the rear.
- (For this purpose, insert the screwdriver through the hole in the back panel).
- Remove the cables from the drive.
- Bend back the guard of the scanner cable.
- Remove the scanner cable from the socket.
- Return the lift into the "Eject" position.
- Slightly lift the left rear side of the drive to undo the connector to the capstan motor.
- Press both catches (S) together with fine pliers and lift the drive around the snapholders.
- The drive may be separated from the motherboard.

Assembly

Assemble in reverse order.

Important

Observe that the cables (K1; K2; K3) are positioned in the supports on the rear of the frame and that the ground screw (D) is screwed in!

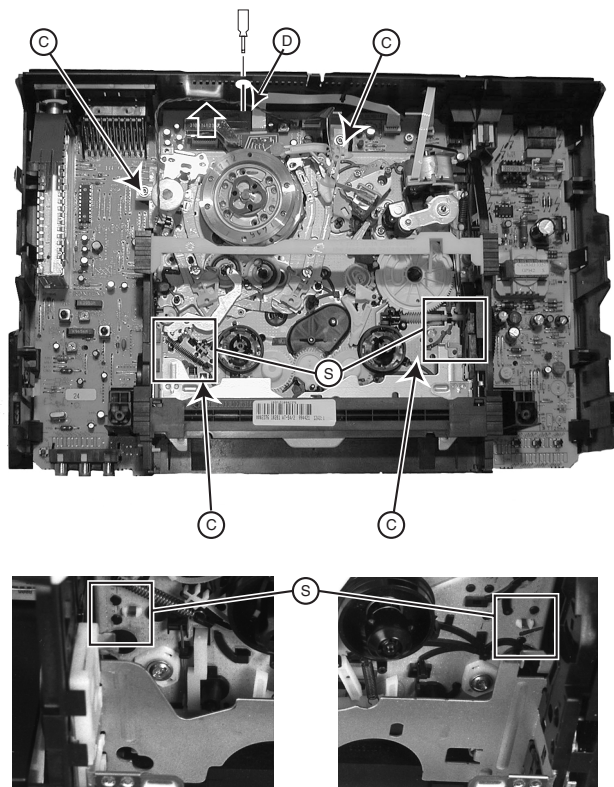
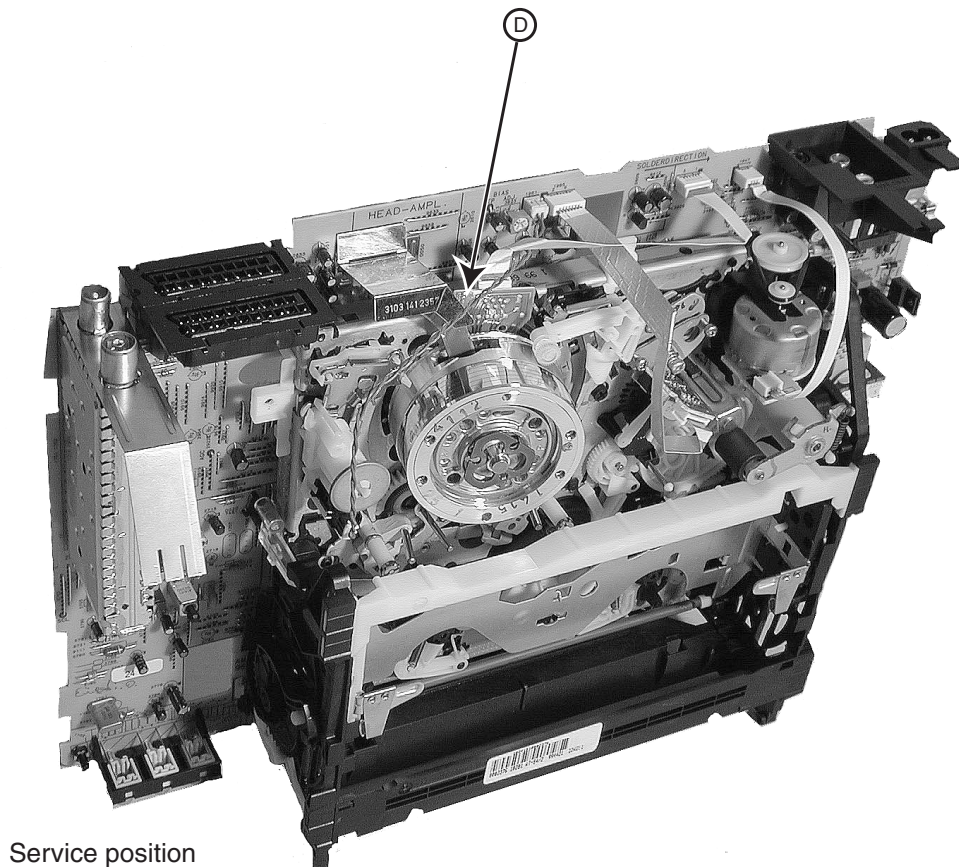


Figure 4-5



Service position

Figure 4-6

5. Service modes, Repair tips

5.1 Special functions

5.1.1 Erasing the EEPROM

- Disconnect from mains
- Push and hold down the Standby key, reconnect to mains and keep the Standby key depressed for a further 3 sec.

All EEPROM data will then be erased and initialised (timer and transmitter channels). The internal processor RAM will also be erased, but the option codes, deck parameters and adjustment values are maintained.

5.1.2 After changing the EEPROM or Motherboard the following steps must be carried out:

- Step 40:** Option code input
- Step 51:** Gap position adjustment
- Step 52:** Studio Picture control' adjustment
- Step 53:** Input of clock correction
- Step 62:** Adjustment of Audio Linear Playback Level
- Step 99:** Clock frequency output

5.2 Service test program

5.2.1 Introduction

The software program for the control, deck and operating microprocessors includes a service test program. It was divided into the following steps, with the following 'modes':

- Step 00:** Display of mask version number
- Step 01:** Check of the drive positions
- Step 02:** Display of the deck - error codes
- Step 03:** Deck - sensors and manual tracking
- Step 04:** Display of operating hours counter
- Step 05:** Display of the IIC-Bus Communication
- Step 10:** Operation without drive - dummy mode
- Step 40:** Option code input

Adjustment Steps in the service test program:

- Step 51:** Gap position adjustment
- Step 52:** 'Studio Picture control' adjustment
- Step 53:** Input of clock correction
- Step 62:** Adjustment of Audio Linear Playback Level
- Step 98:** Display test
- Step 99:** Clock frequency output

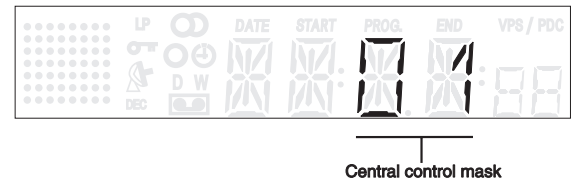
In the service test program, all drive functions apart from the channel search and channel change mode can be carried out. The program position set before entering the service test program is maintained.

5.2.2 Activating the service test program

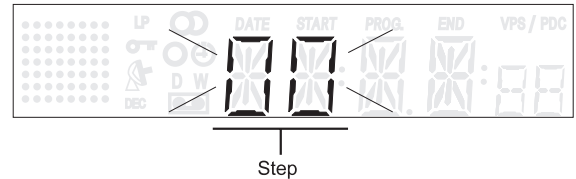
Press and hold down the STOP key on the remote control. Then press the PLAY key on the recorder and keep it depressed for at least 5 sec. The STOP key on the remote control may be released whilst the PLAY key on the recorder is pressed.

The service test program can be selected in any operating mode apart from the channel search, install, clock set-up and cassette length calculation mode. The recorder and all drive functions are fully operational in the service mode.

The display shows, for instance:

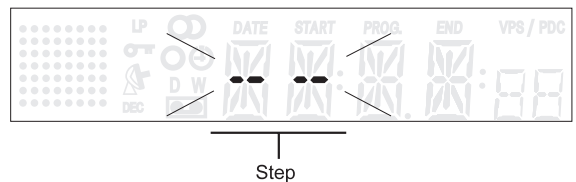


By pressing the SELECT key on the remote control, all step modes may be left and the currently selected step number appears and flashes.



Other service steps are selected with the UP and DOWN keys or the numerical remote control keys. By pressing the SELECT key on the remote control whilst the Step is flashing, the respective mode can be entered or left.

If a step is selected to which no mode is assigned, the displays shows - - and flashes.



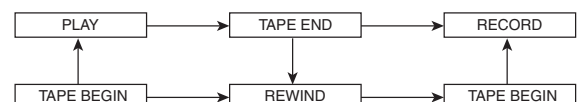
To leave the service program, press the STAND-BY key or disconnect recorder from mains.

5.2.3 Service mode functions

Endurance test

In the service test program, the recorder can be endurance tested. For this purpose, use a cassette and activate "PLAY" or "REC". The functions are then repeated continuously. In RECORD, the recorder does not move to EJECT at the tape end, but to REWIND, after which it starts to RECORD again. This test serves to detect intermittent faults. The last error is stored in the EEPROM. (The fault remains stored even after a power failure).

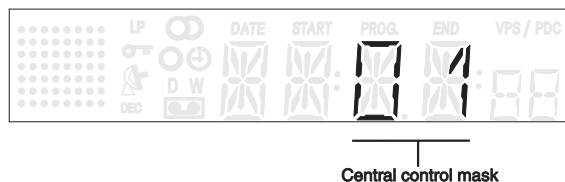
The endurance test is ended by pressing STOP or leaving the service test program.



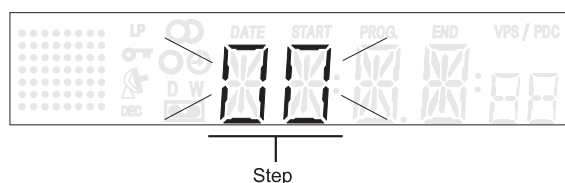
5.2.4 Description of steps with modes:

Step 00: Display of mask version number

After activating the service test program, step 00 and the mask version number are automatically displayed.



The mode can be left again by pressing the SELECT key on the remote control. The currently selected position number appears and flashes on the display.



A step between 00 and 99 can now be selected

Step 01: Checking the drive positions

By pressing the SELECT key whilst Step 01 is flashing, the drive position appears on the display.

The FTA signal from the photoelectric barriers which controls the revolutions of the loading motor is used to check the drive condition.

The drive position is shown as a 3-digit decimal number by counting the FTA pulses on the display.

(e.g. 213 = Play)



Table of drive positions:

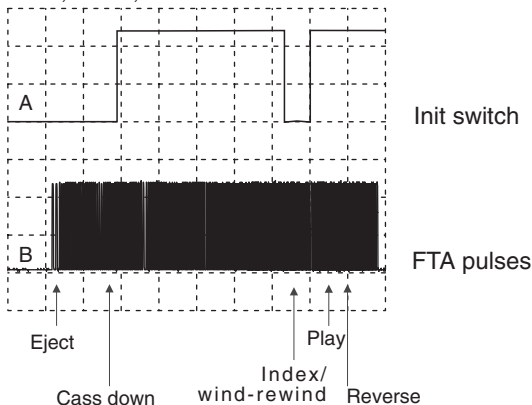
Status	Position (FTA dec)
Eject	007 +2/-2
Index	191 +0/-2
Stop	200 +4/-4
Play	213 +4/-4
Reverse	237 +2/-0

Function of the Init switch:

The diagram shows the function of the Init switch, depending on the position of the deck. The number of FTA pulses is important for the position of the drive.

A: DC, 2 V/Div, 0.5 s/Div

B: DC, 2 V/Div, 0.5 s/Div



Step 02: Display of the deck error codes

By pressing the SELECT key whilst Step 02 is flashing, the deck error code is shown on the display.

Checking the drive function

Loading and unloading time

The signal (FTA) of the photoelectric barrier which controls the revolutions of the loading motor is used as a reference for the loading and unloading time.

Stopping of supply or take-up reels

The tacho signals of the left (WTL) and right (WTR) winding disks are used as control reference.

Stopping of head drum motor

This is monitored with the PG/FG signal. The signal is discharged from the e.m.f. of the non-conducting spools of the head cylinder motor, showing the position of the head cylinder.

Capstan motor fault

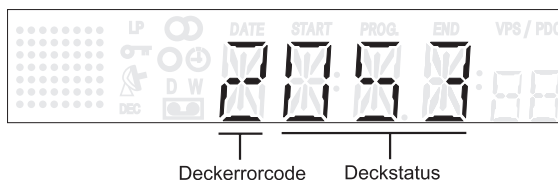
This is monitored with the FGD signal. If one of the above sensor signals is not available, the recorder tries to put the lift into the "EJECT" position.

Explanation of deck error codes and deck error status

The last error code is stored and remains in the EEPROM, even if the recorder is disconnected from the mains.

The error code can be erased by pushing the CLEAR button on the remote control.

The display shows, for instance:



The left digit shows the error:
(e.g.: Error 2 = Capstan error)

Error table:

0	no error
1	threading error
2	no capstan pulses
3	tape broken
4	no pulses left reel
5	no pulses right reel
6	head motor error

The 3 digits on the right represent the deck error condition:

(e.g.: 053 = during Play)

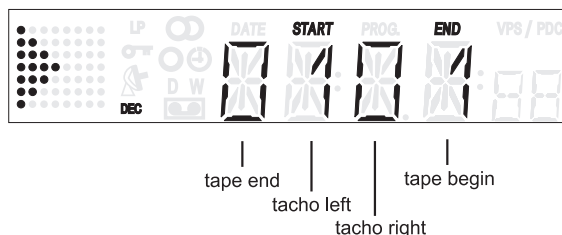
The error code can be reset in this step with the CLEAR key.

Functiontable:

012	Standby	114	VISS write	211	Slowmotion 1/24
014	Autotracking	115	Viss erase	212	" " 1/14
031	Play-3	125	Tuner - Stopout	215	" " 1/7
034	Slow_reverse	126	Auto Remain Funct	216	" " 1/2
041	Still Picture	130	ATTS Function	217	" " -1/24
042	Fast	168	Frame+	218	" " -1/14
044	Play-9	169	Frame-	219	" " -1/7
045	Eject	170	Play-11	220	" " -1/2
046	Play9	171	Play-7	222	Edit Record
047	Play-1	172	Play-5	223	Align of Gap
048	Pause	173	Play5	238	Pause
050	Rewind	174	Play7	239	SPC align
052	Wind	175	Play11	246	Edit Pause
053	Play	196	Tuner - Eject	247	Slow motion 1/10
054	Stop out	197	Standby Eject	248	" " 1/18
055	Record	199	Audio Dubbing	249	" " -1/10
112	Index next	202	Audio Dubb. Pause	250	" " -1/18
113	Index previous	206	Reset Tapecounter	253	Key Released

Step 03: Deck sensors and manual tracking

By pressing the SELECT key whilst step 03 is flashing, the deck sensors will be displayed in one digit as either 1 or 0.



■ ● ◀ ▶ are used to display the deck status

START init switch (INIT)

END record protection (RECP)

DEC Loading pulses (FTA)

In the service test program, the tracking is always in the centre position.

Only in this step can the value for the required tape running setting be changed, manually in the PLAY function with the UP / DOWN keys. After leaving the mode with the SELECT key, the tracking value always resets itself to the centre position and cannot be changed.

Step 04: Display of the operating hours counter:

By pressing the SELECT key whilst step 04 is flashing, the operating hours counter shows how many hours the head disk has turned. The hours are displayed as a 4-digit decimal number.

**Step 05: Display of the IIC - Bus Communication:**

By pressing the SELECT key whilst step 05 is flashing, the available IIC- components will be displayed with symbols.



Symbol	Description	Component	Position
	VPS or VPO IC	SDA5650 or SDA5652	7502
DEC	FM ST / NIC IC	MSP 3415D	7761
	FM St IC	TDA 9873	7760
W	Video switch IC	STV 6401	7904
D	FM Audio IC	TDA 9605H	7650
	Tuner Philips	TP9xx	1701
O	Tuner Alps	TMRxx/TCBZ4	1701
	Modulator Phil	TP9xx	1701
LP	Modulator Alps	TMRxx/TCBZ4	1701
	Signal electr. IC	LA71595M	7004

The following errors are visible in the display when the start up routine of the set isn't working properly.

E000 IIC-Data line is low

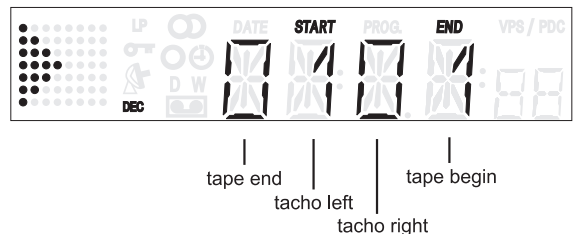
E001 IIC-Clock line is low

E002 EEPROM give no acknowledgement

**Step 10: Operation without drive - dummy mode**

Before activating this mode with the SELECT key, the recorder must be in the EJECT position.

Enter the mode by pressing the SELECT key. The motors are then switched off and the sensors will be ignored by the deck microprocessor. The drive can now be dismantled from the motherboard (see dismantling instructions). **Only install drive if recorder is disconnected from mains.** For signal tracking, the recorder can be set to all drive conditions, i.e. signal electronics, audio and IO processing are switched to the respective operating mode.



■ ● ◀ ▶ are used to display the deck status

START init switch (INIT)

END record protection (RECP)

DEC Loading pulses (FTA)

Step 40: Option code input

If a new EEPROM is installed in the course of repairs, it must be initialised.

By pressing the SELECT key whilst step 40 is flashing, the decimal option A appears in the display.



By entering a 3-digit decimal code, the correct features are set.

These codes are shown on the type-plate of the recorder. After pressing the OK key on the remote control, the entered code is saved. The display shows OK for approx. 3 sec. and then the stored value in decimal format.



By pressing the UP and DOWN keys, the available options (A to G) can be selected. The display shows the last stored value in decimal format.



In case of an invalid entry (value >255) the activation of the OK key causes the content of the last stored option to be displayed and OK does not appear in the display.

Depending on the model, some bits are software or default protected and cannot be changed by an entry. In this case, the display shows OK, but the display returns to the default value.

Step 98: Display Test

By pressing the SELECT key whilst step 98 is flashing, all segments of the display are illuminated.

The step is exited by pressing SELECT again.

Engineer's remarks:

[illegible]

5.3 Repair tips

5.3.1 Replacement procedure for leadless components (chip)

The following procedures are recommended for replacing leadless components used in this unit.

1. Preparation for replacement

- Soldering iron
Use a pencil-type soldering iron that uses less than 30W
- Solder
Use Eutectic solder (Tin 63%, Lead 37%)
- Soldering time
Maximum 4 seconds.

Note:

- Leadless components must not be re-used after removal.
- Excessive mechanical stress and rubbing of the component electrode must be avoided.

2. Removing the leadless components

Grasp the leadless component body with tweezers and alternately apply heat to both electrodes. When the solder on both electrodes has melted, remove leadless component with a twisting motion.

Note:

- Do not attempt to lift the component off the board until the component is completely disconnected from the board with a twisting motion.
- Be careful not to break the copper foil on the printed circuit board.

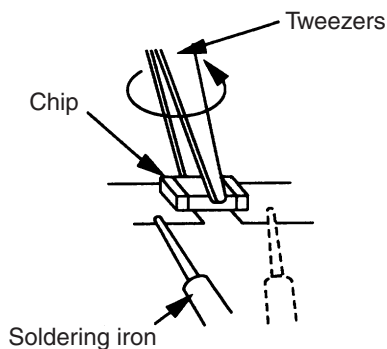
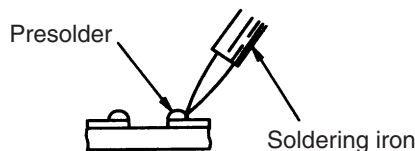


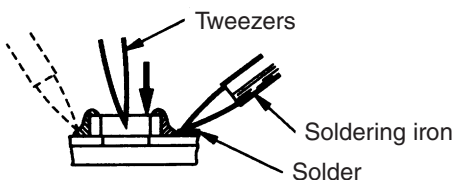
Figure 5-1

3. Installation of leadless components

- Presolder the contact points on the circuit board



- Using tweezers press down the part and solder both electrodes as shown below.



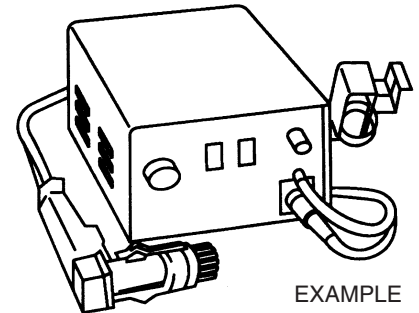
Note:

Do not glue the replacement component to the circuit board.

5.3.2 How to remove/install the Flat Pack IC

How to remove the Flat Pack IC

- Using a hot air Flat Pack IC unsoldering equipment



EXAMPLE

Figure 5-2

- Prepare the hot air Flat Pack IC unsoldering equipment. Then apply hot air to Flat Pack IC for 5 - 8 seconds.
- Remove the Flat Pack IC with tweezers while applying the hot air.

CAUTION:

To avoid damage, do not apply the hot air to the chip parts around the Flat Pack IC for long periods.

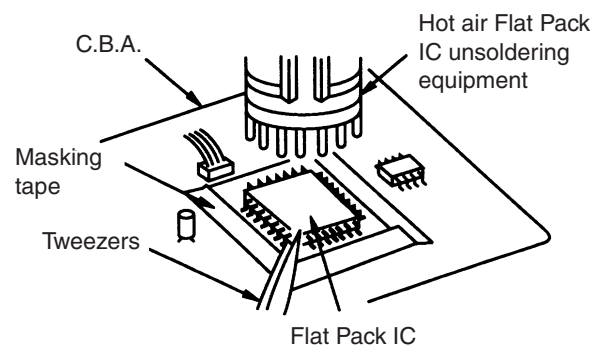


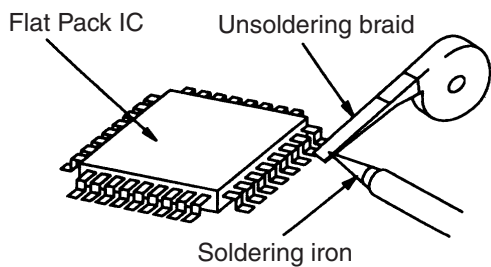
Figure 5-3

Put masking tape around the Flat Pack IC to protect adjacent parts.

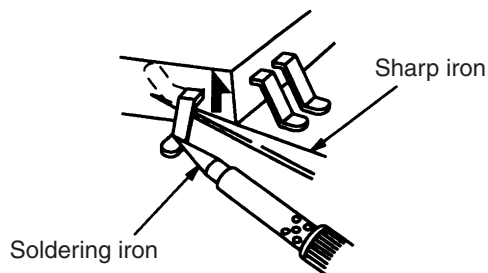
The Flat Pack IC is fixed to the P.C.B. with glue; therefore take care not to break or damage any foil under the IC or on each pin when removing it.

- Using a soldering iron

- Use unsoldering braid to remove the solder from all pins of the Flat Pack IC. Apply solder flux to all pins of the Flat Pack IC, to allow easy removal.



b. Lift up each lead of the Flat Pack IC individually, using a sharp pin or non-solder wire (iron wire), while heating the pins using a fine tip soldering iron or a hot air blower.



• Using iron wire

a. Use unsoldering braid to remove the solder from all pins of the Flat Pack IC. Apply solder flux to all pins of the Flat Pack IC, to allow easy removal.

b. Affix the wire to workbench or solid mounting point (see figure 5-3)

c. Pull up the wire as the solder melts in order to lift the IC lead from the P.C.B. contact pad, while heating the pins using a fine-tip soldering iron or hot air blower.

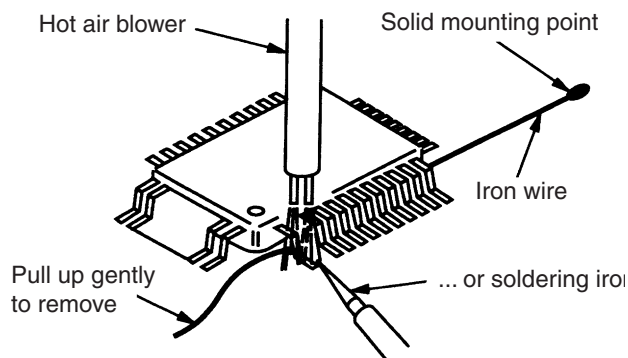


Figure 5-4

Note:

When using a soldering iron care must be taken to ensure that the Flat Pack IC is not held by glue or the P.C.B. may be damaged if force is used.

If the IC is glued, heat the IC with hot air to loosen the glue.

• Using a special removal device

a. Apply extra tin-lead solder onto the pins

b. Heat the IC to melt the glue which has been used to affix it

c. Use a solder removing device with a special punch which matches the contours of the IC to remove the IC.

At the other corners there are printed conductors which may be damaged!

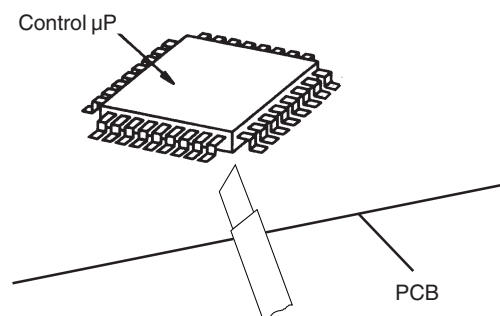
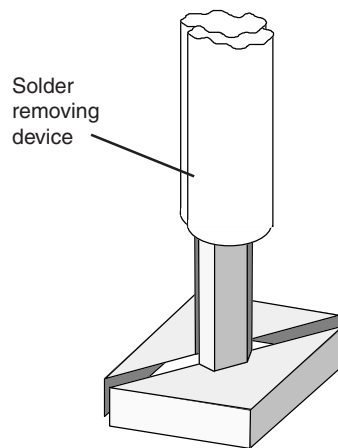


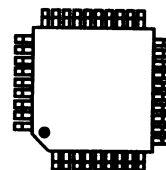
Figure 5-5

How to install the Flat Pack IC

a. Use unsoldering braid to remove the solder from the foil of each pin of the Flat Pack IC on the P.C.B. in order to install the replacement Flat Pack IC more easily.

b. The "dot" mark on the Flat Pack IC indicates pin 1. Make sure this mark matches the 1 on the P.C.B. when positioning for installation. Then pre-solder the four corners of the Flat Pack IC. (see figure 5-5).

Example



Pin 1 on Flat Pack IC is marked by a "•".

Figure 5-6

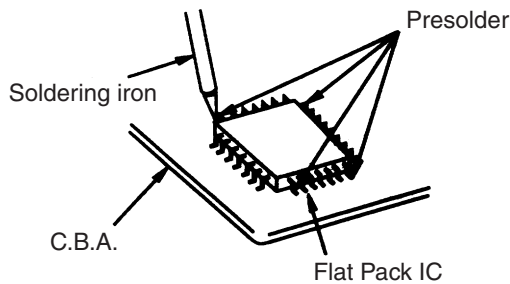


Figure 5-7

c. Solder all pins of the Flat Pack IC. Make sure that none of the pins have solder bridges between pins on the Flat Pack IC.

5.4 Note

All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described in the "SAFETY INSTRUCTIONS" section of this manual.

5.5 Voltage measurements

Color bar signal in SP REC and PB modes.

Note:

Voltage indications for the REC. and PB mode on the schematic diagrams are shown below:

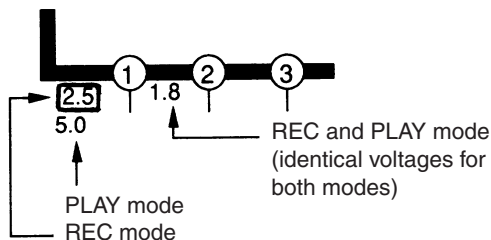


Figure 5-8

5.6 How to read wave forms

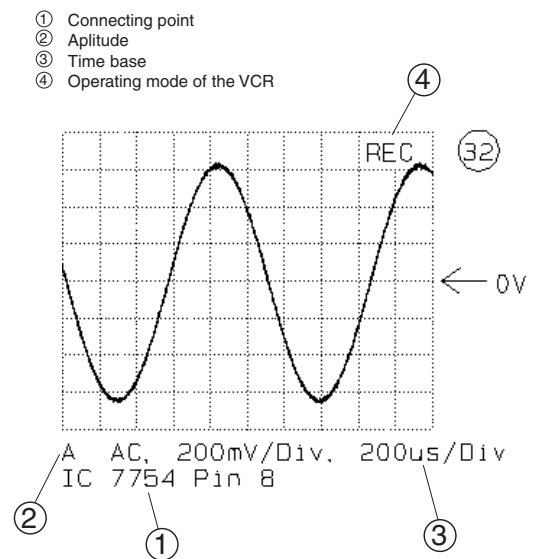


Figure 5-9

5.7 Voltage indication of Zener diodes

The Zener voltage of Zener diodes is indicated as such on schematic diagrams:

Example: BZX79C20.....Zener voltage: 20 Volts

5.8 How to identify connectors on schematic diagrams

Each connector is labeled with a connector number and a pin number indicating to what component it is connected; in other words, its counterpart.

Use the Connecting Wiring Diagram to find the connections between associated connectors.

Example:

The connections between C.B.A.s are shown below:

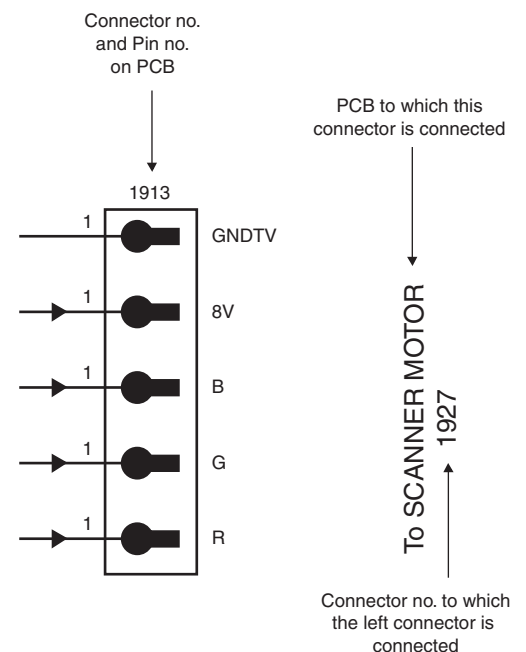


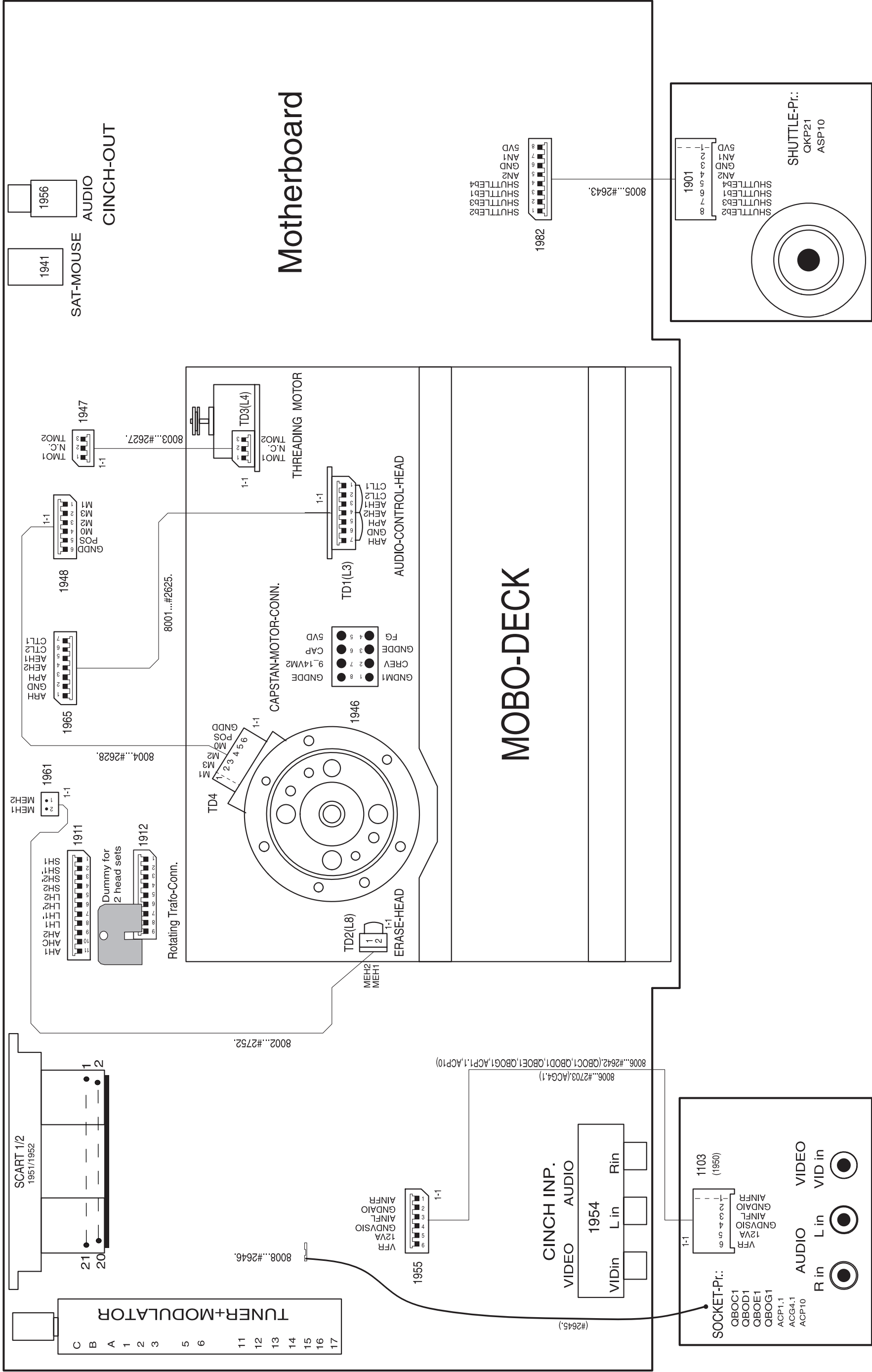
Figure 5-10

Engineer's remarks:

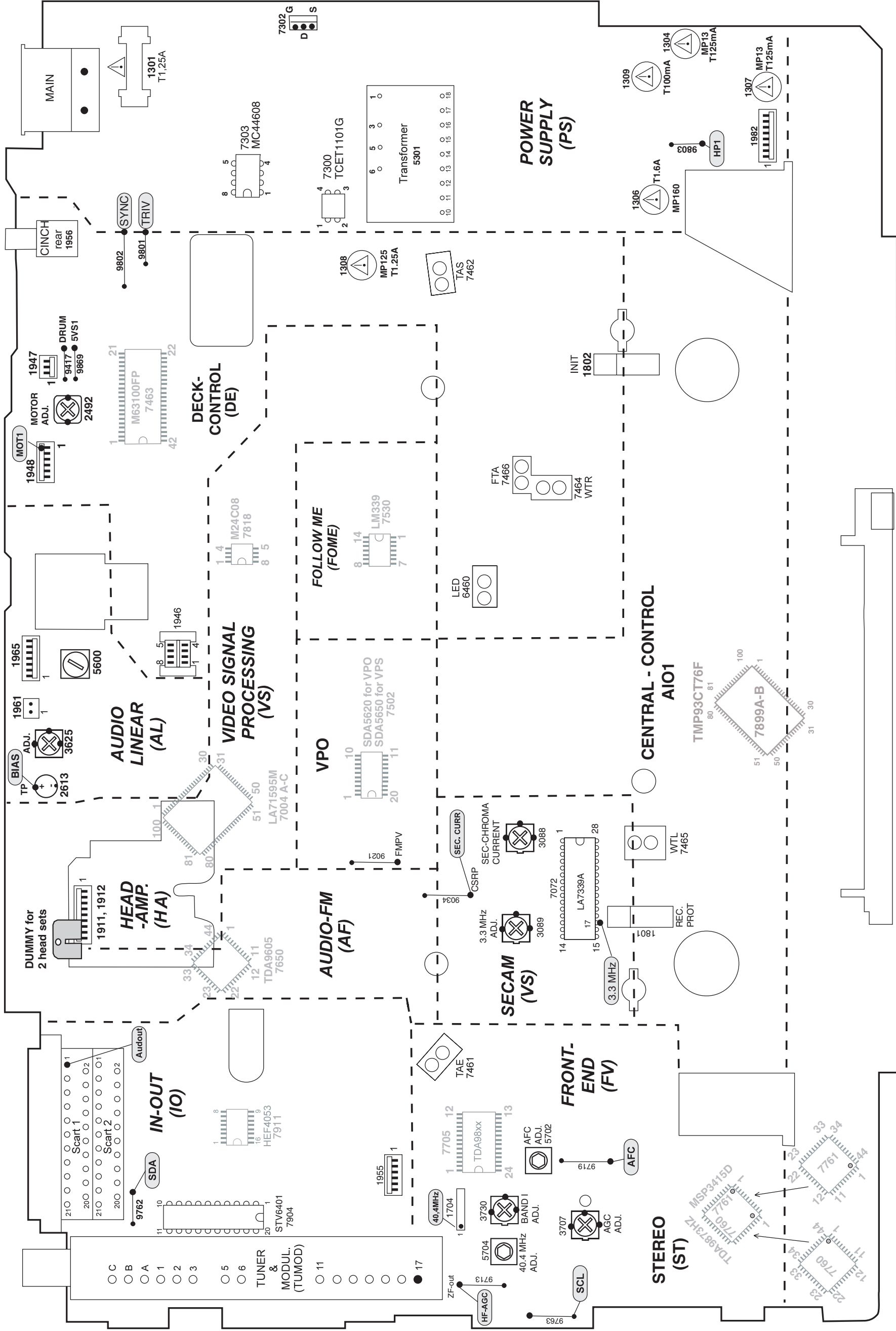
[illegible]

6. Block diagrams, Waveforms, Wiring diagram

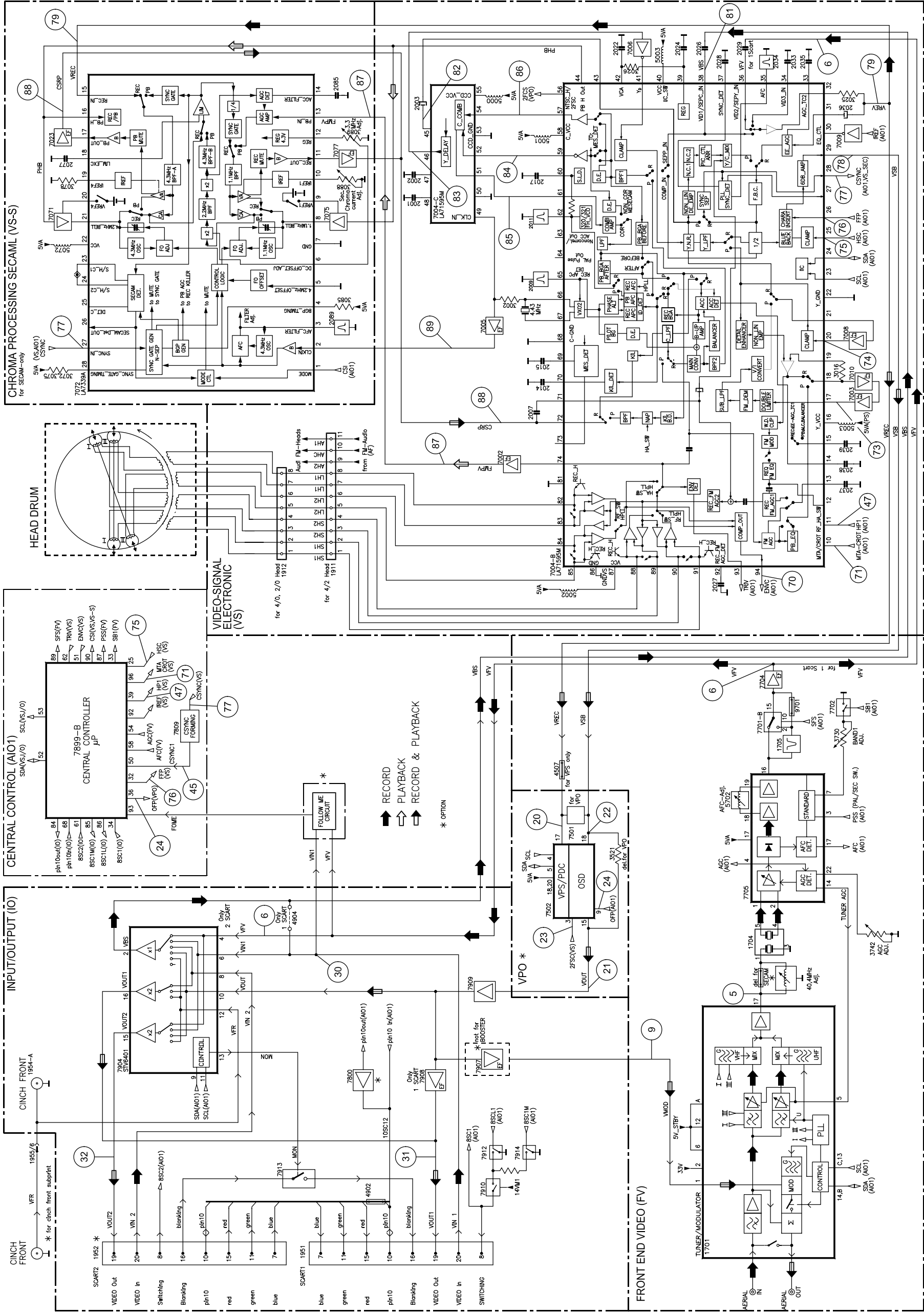
6.1 Wiring diagram



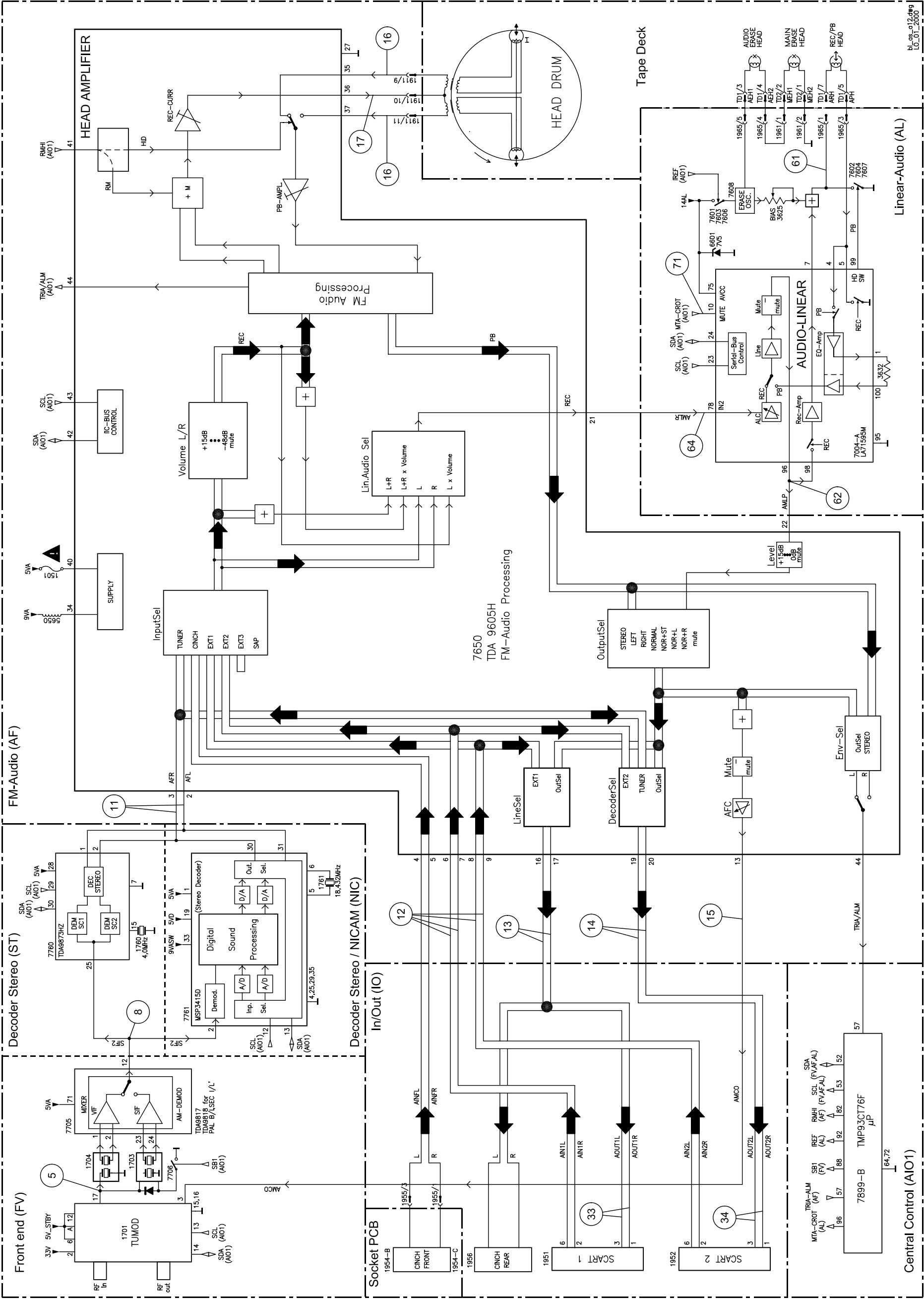
6.2 Test point overview



6.3 Block diagram Video

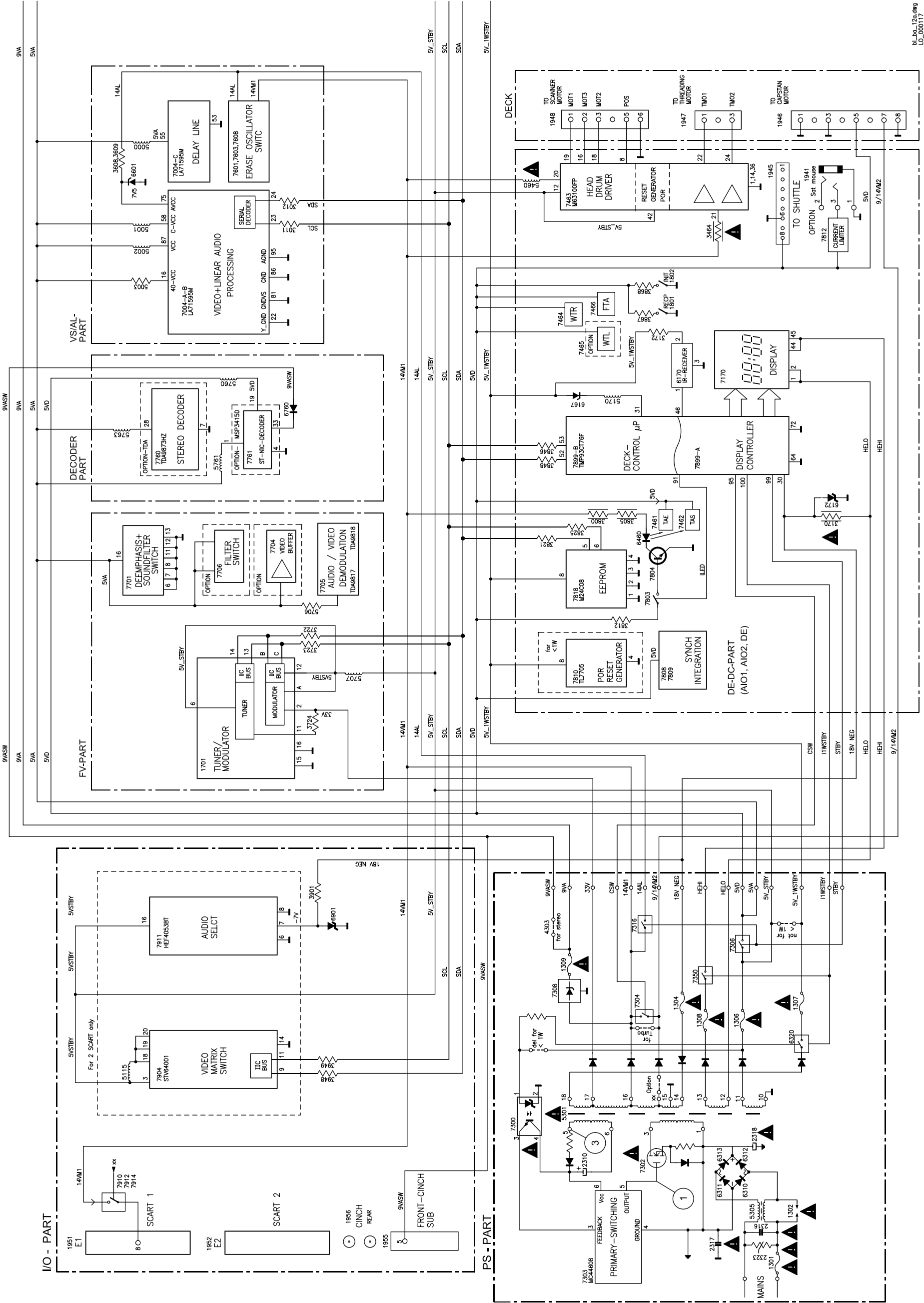


6.5 Block diagram Audio Stereo

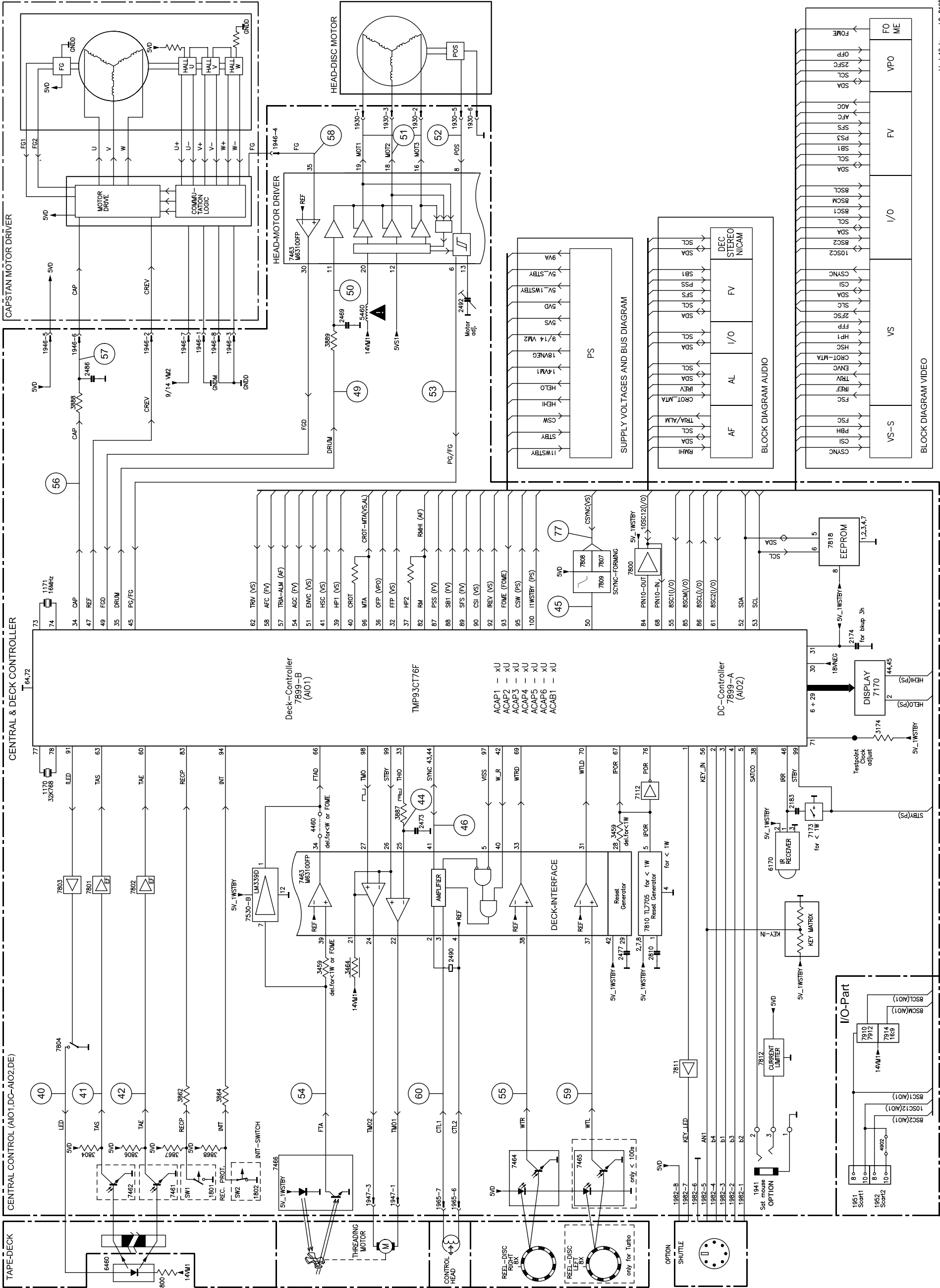


bl_05_012.dwg
10_01_2000

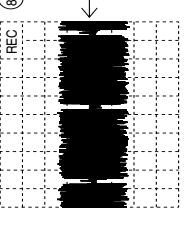
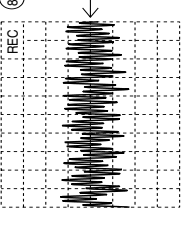
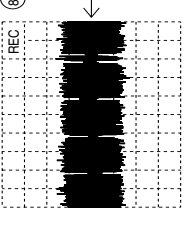
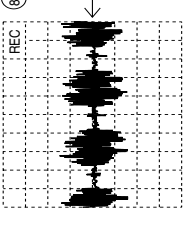
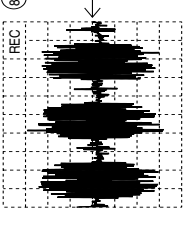
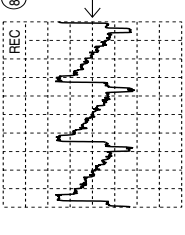
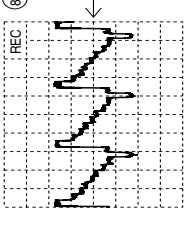
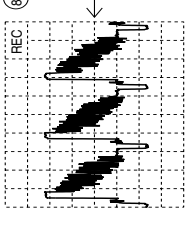
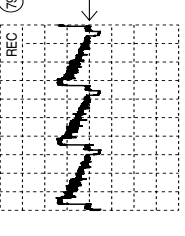
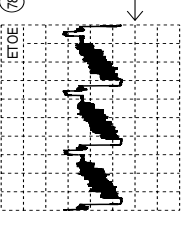
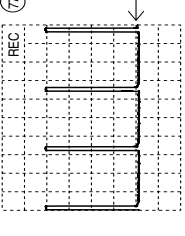
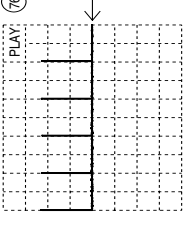
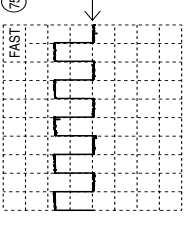
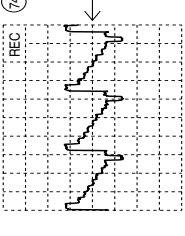
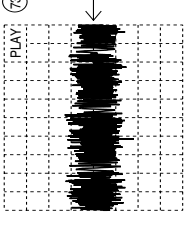
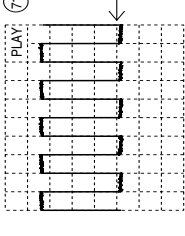
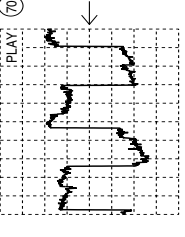
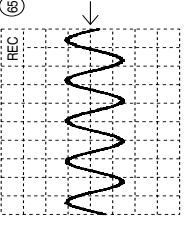
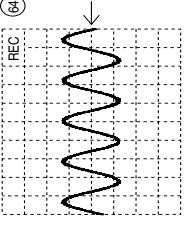
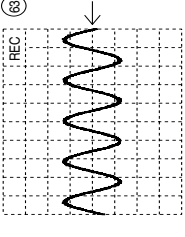
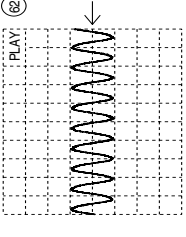
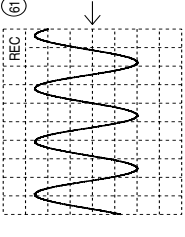
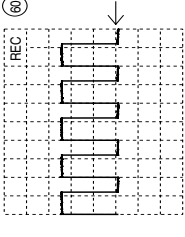
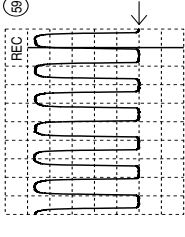
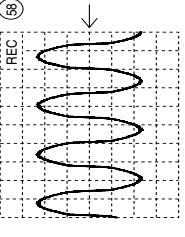
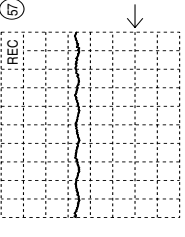
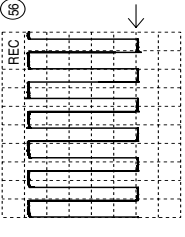
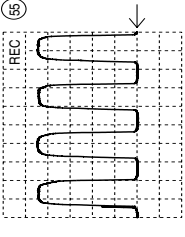
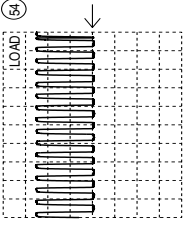
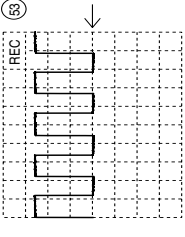
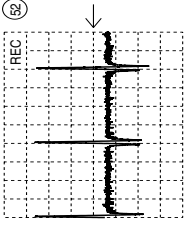
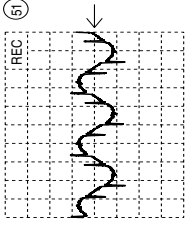
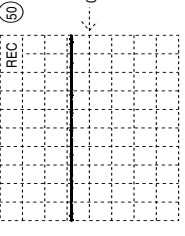
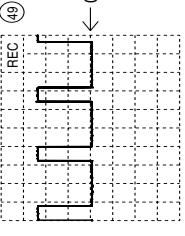
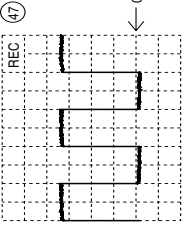
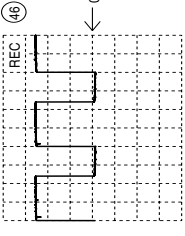
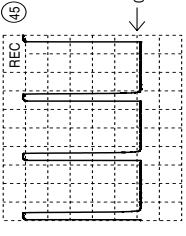
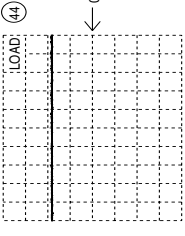
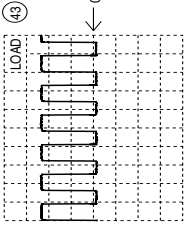
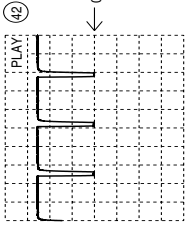
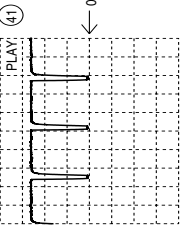
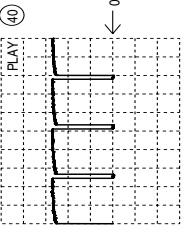
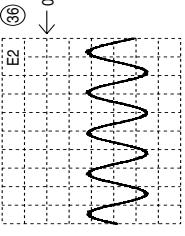
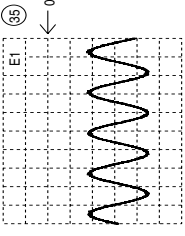
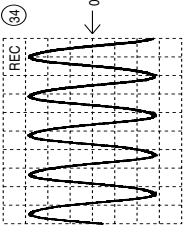
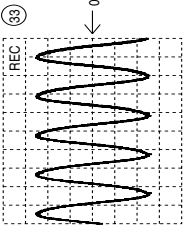
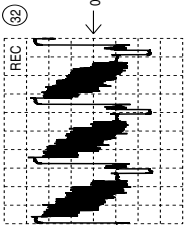
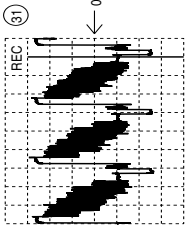
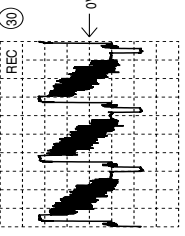
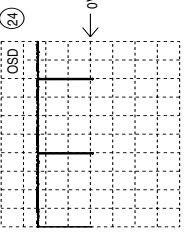
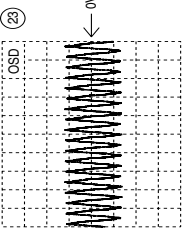
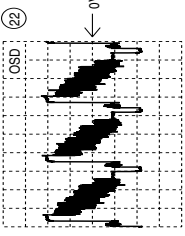
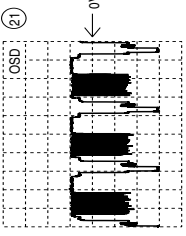
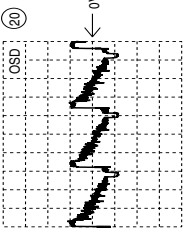
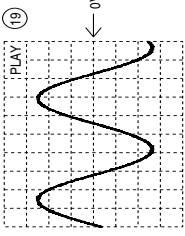
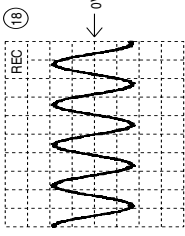
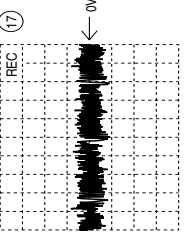
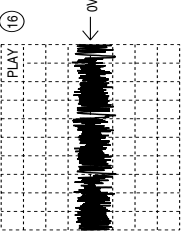
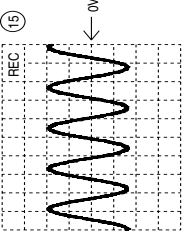
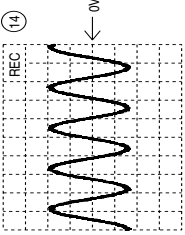
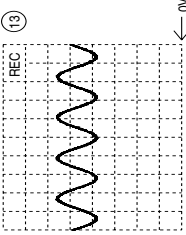
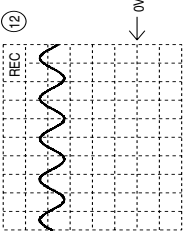
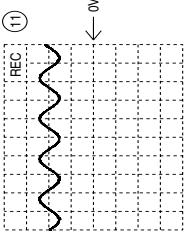
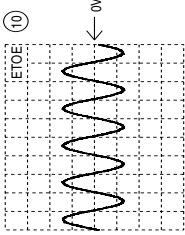
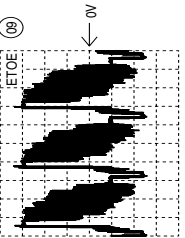
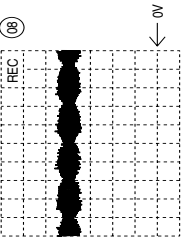
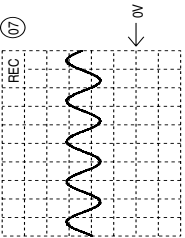
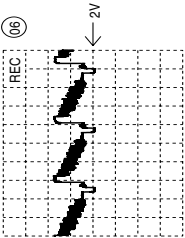
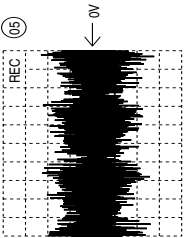
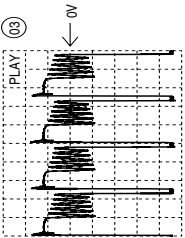
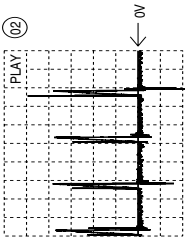
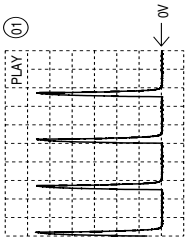
6.6 Supply voltages and Bus diagram



6.8 Block diagram Central Control (AIO2, AIO2)

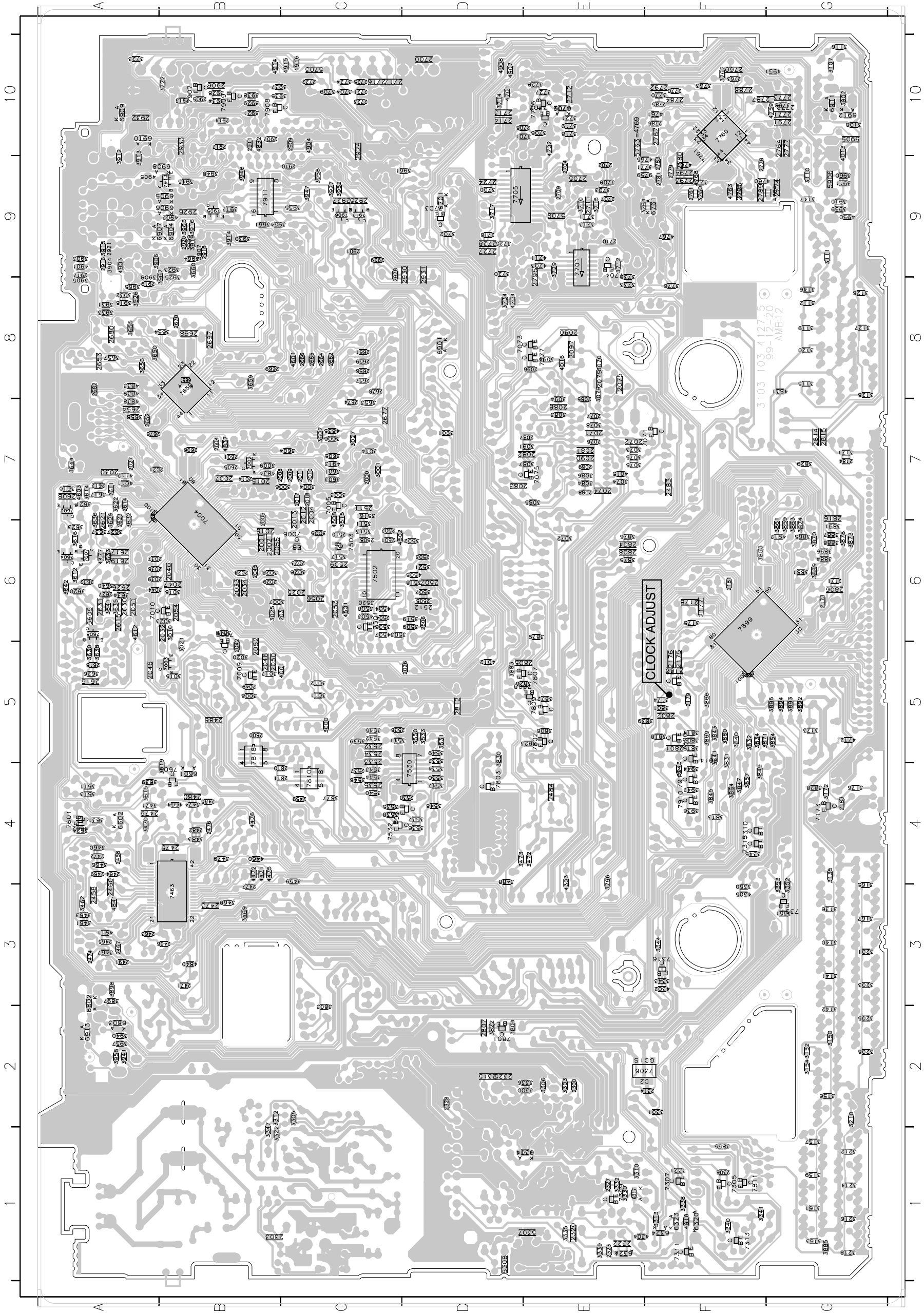


6.9 Waveforms



7. Circuit diagrams and PWB layouts

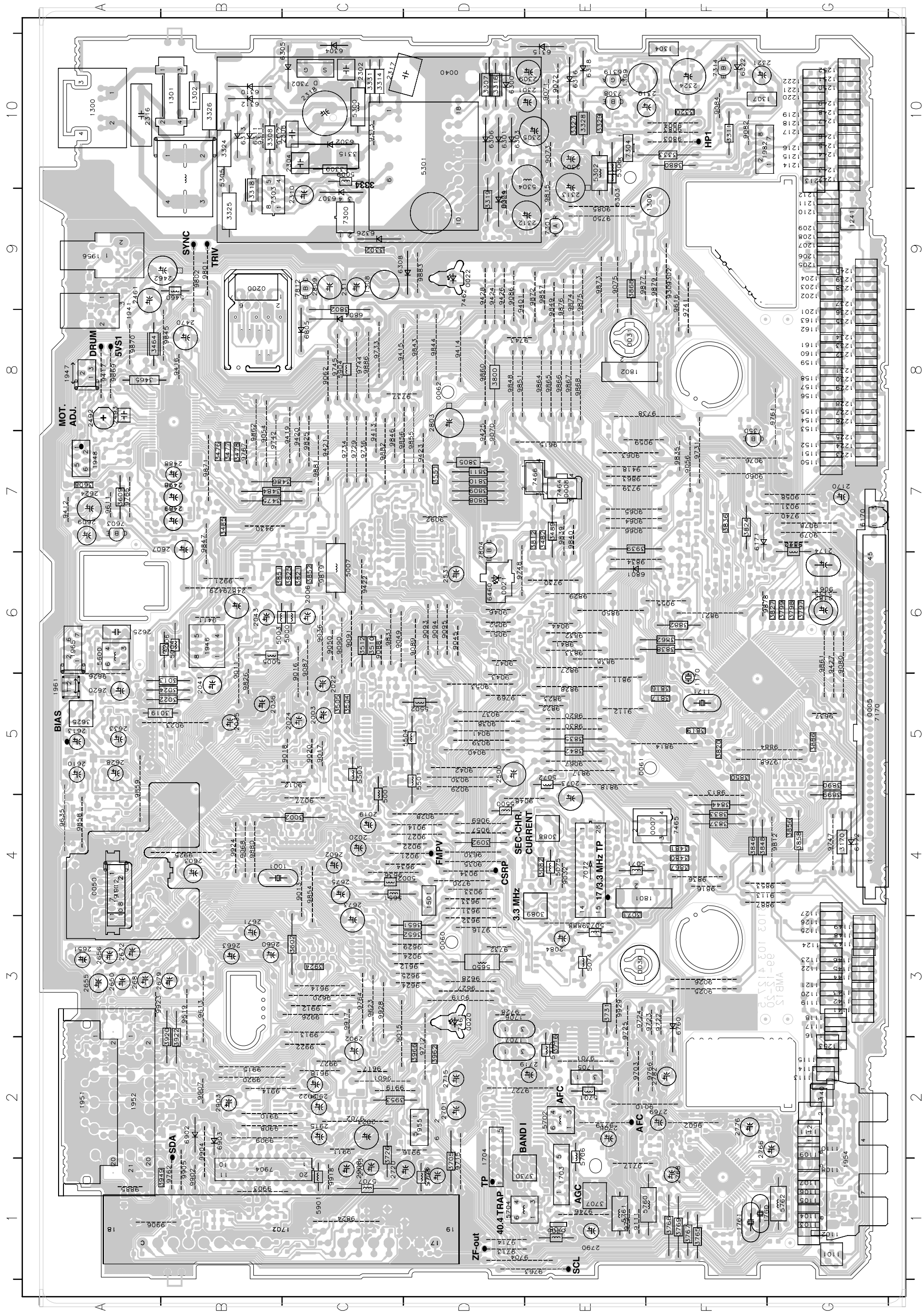
7.1 Mother board - solder side



Engineer's remarks:

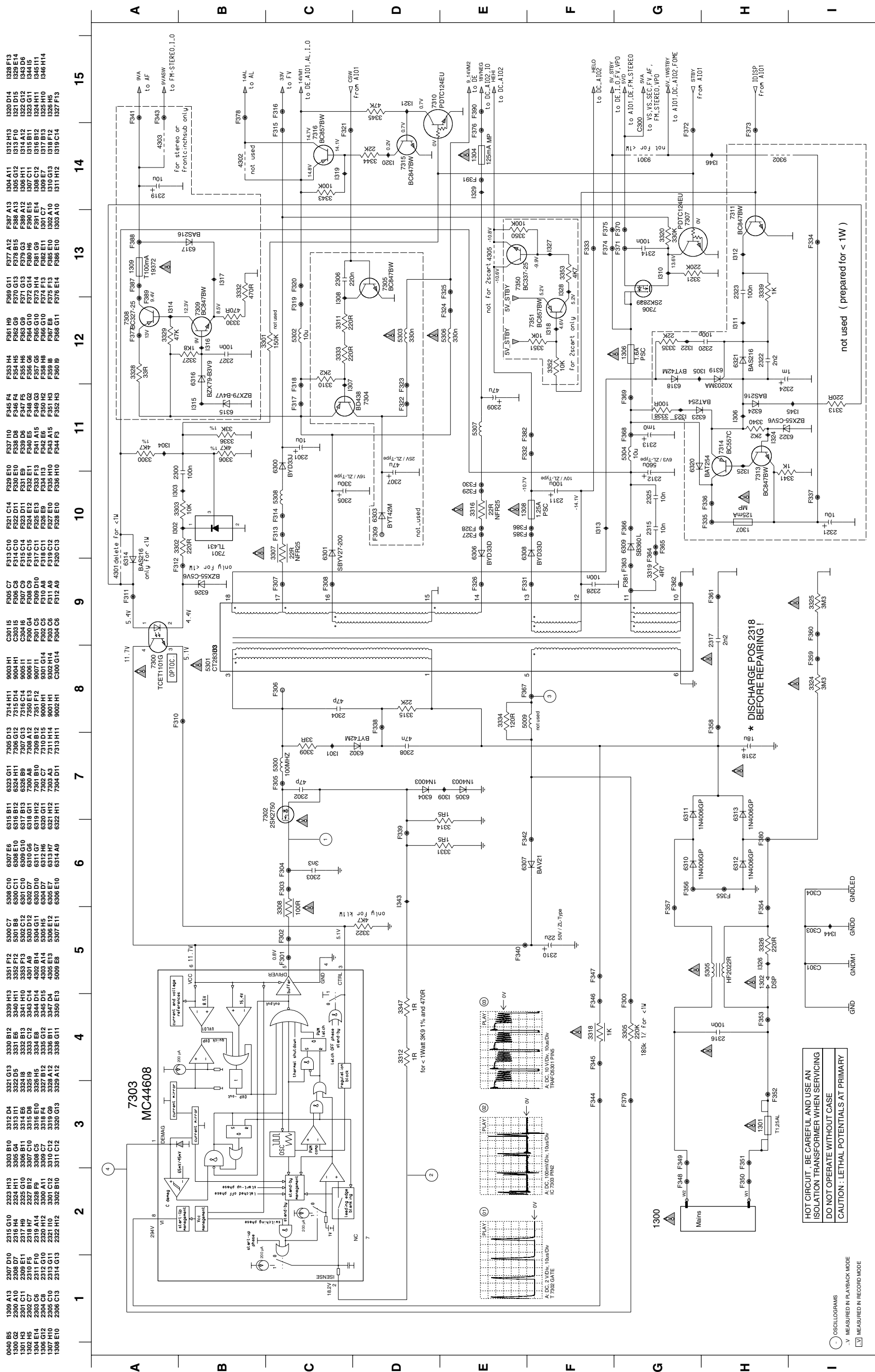
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7.2 Mother board - component side

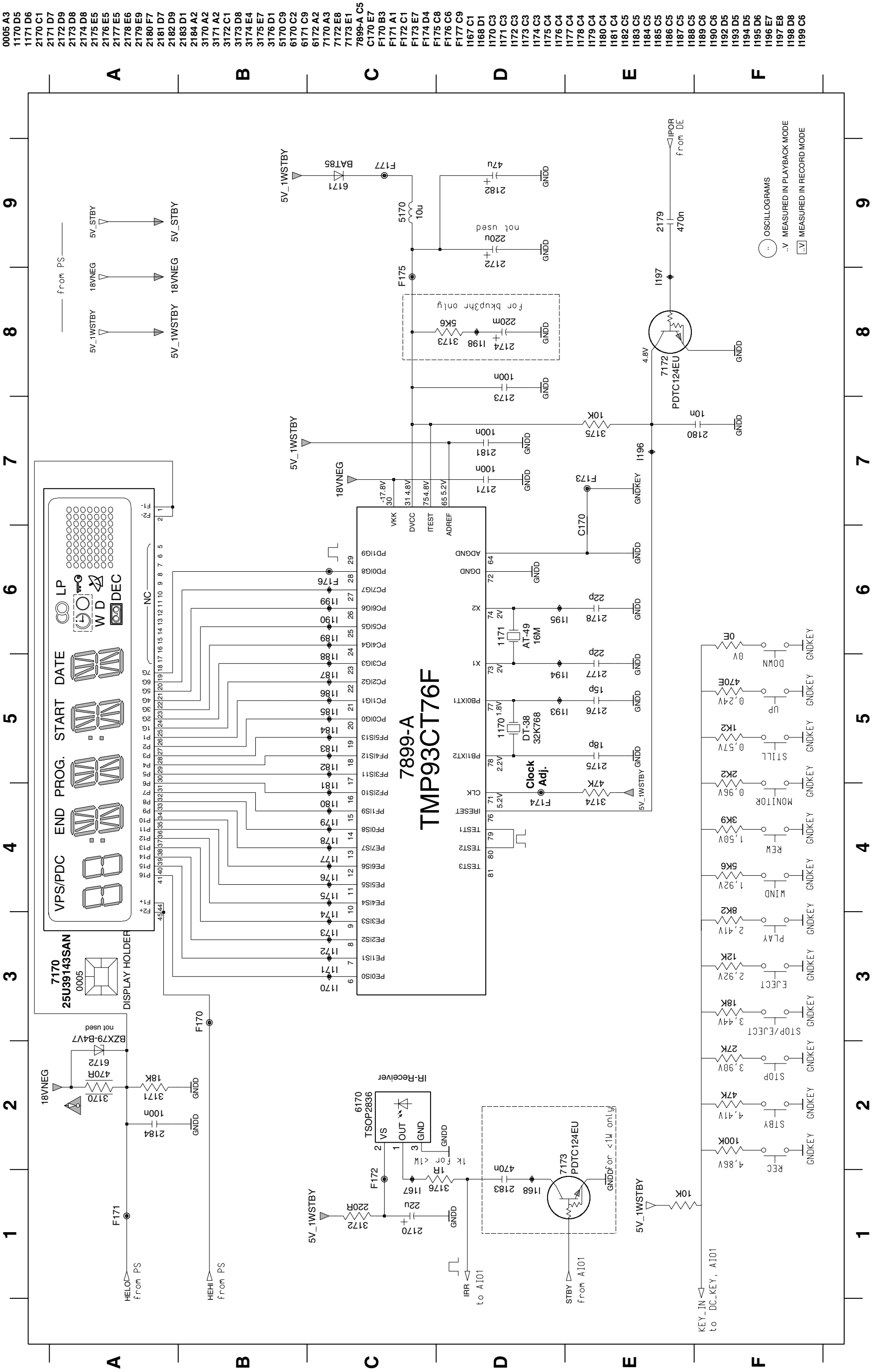


7.3 Power supply (PS)

VR101



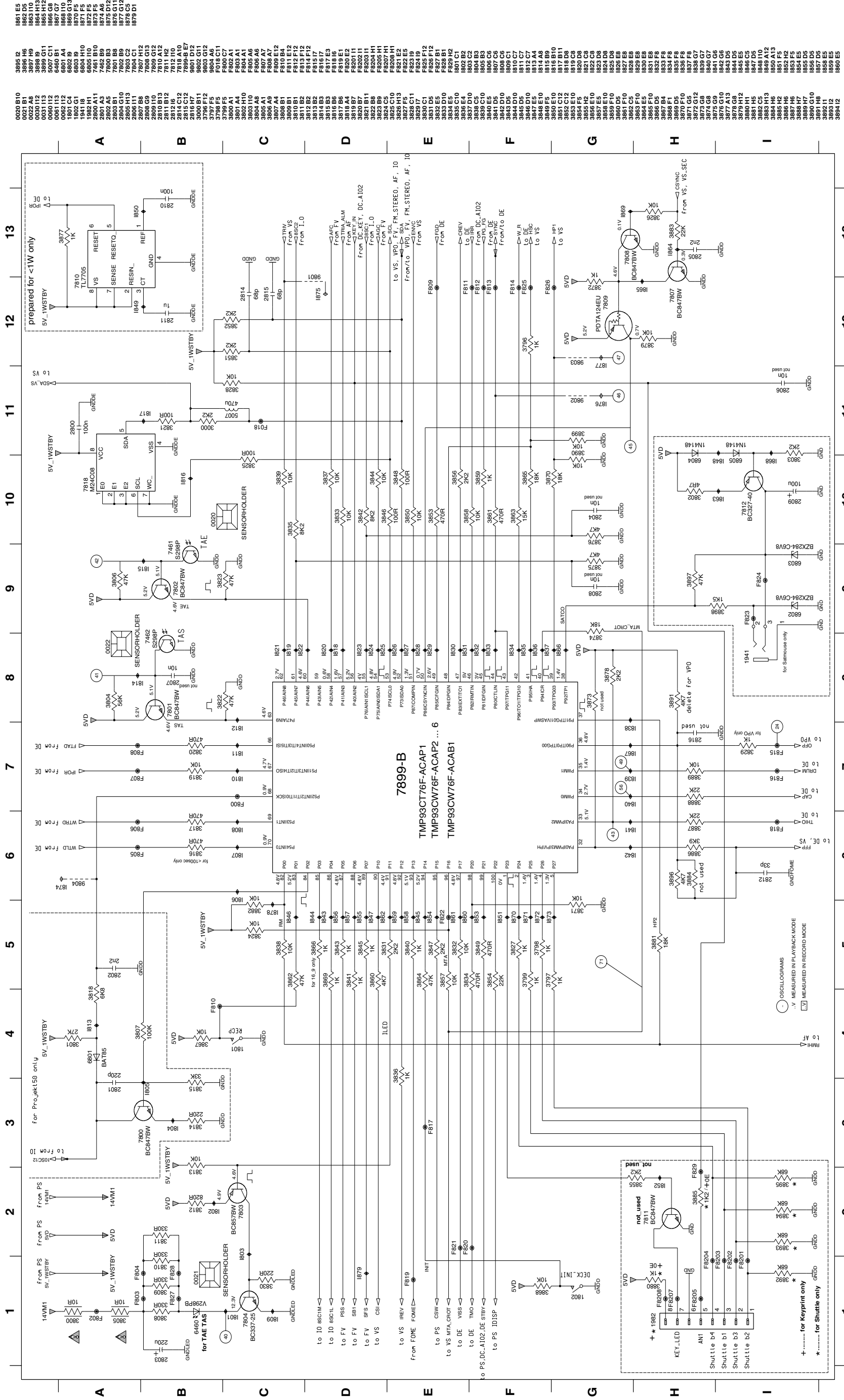
7.4 Display control (AIO2)



Interconnections:

AF page 65	AL page 64	AIO1page 58	AIO2 page 57	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VPO page 68	VS page 67	VS_S page 66

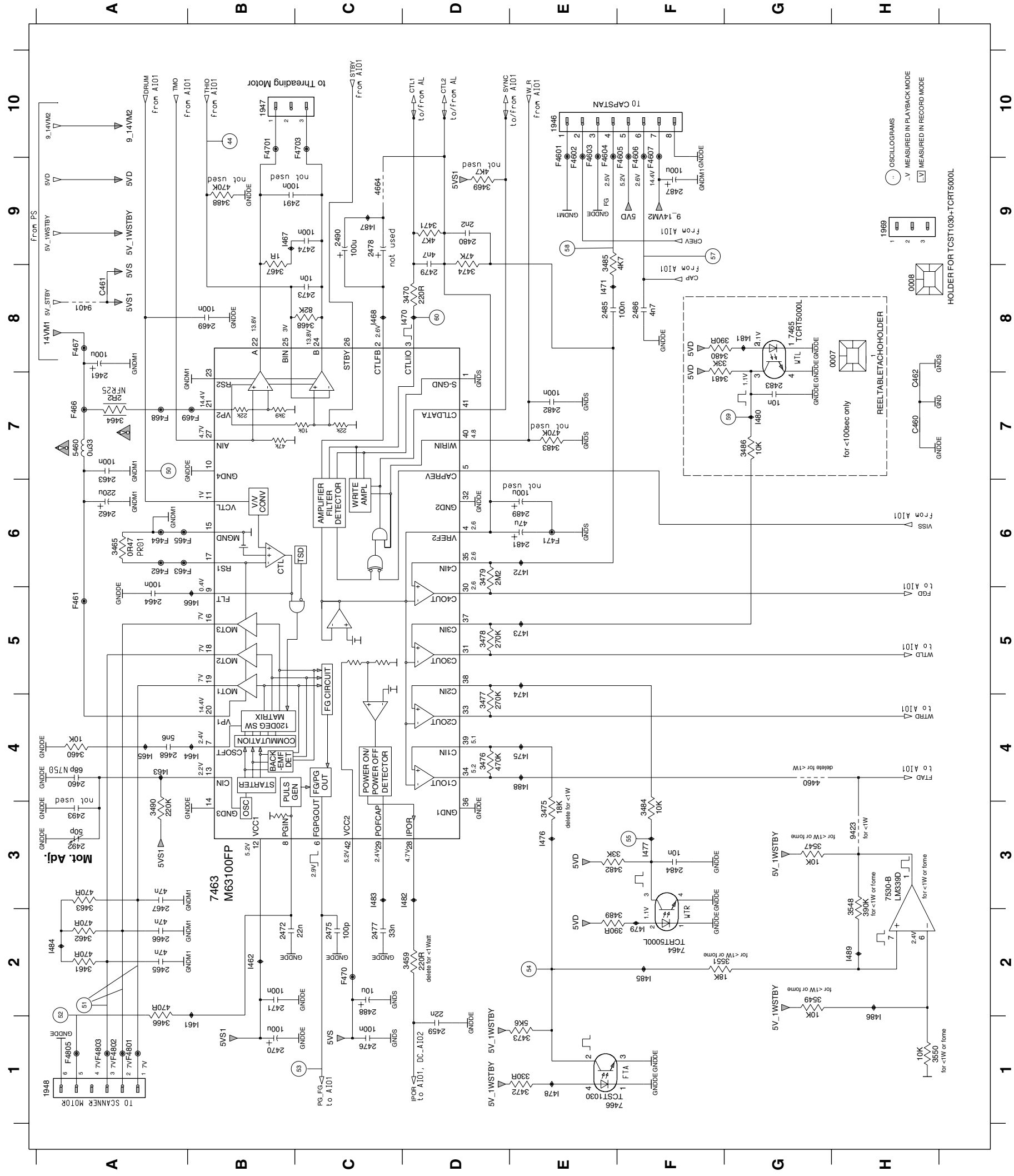
7.5 Central control (AlO1)



Interconnections:

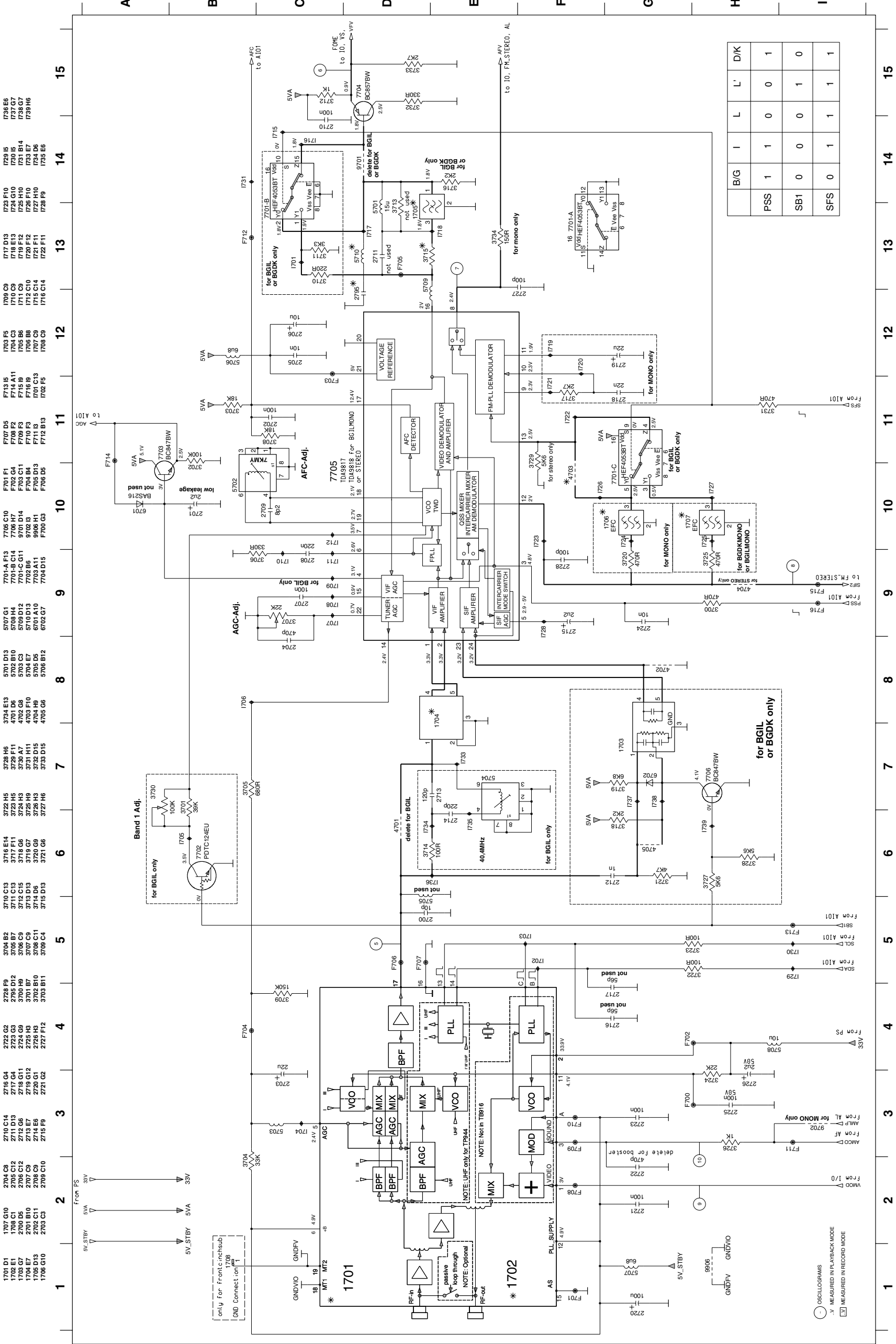
AF page 65	AL page 64	AIO1page 58	AIO2 page 57	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VPO page 68	VS page 67	VS_S page 66

7.6 Deck control (DE)

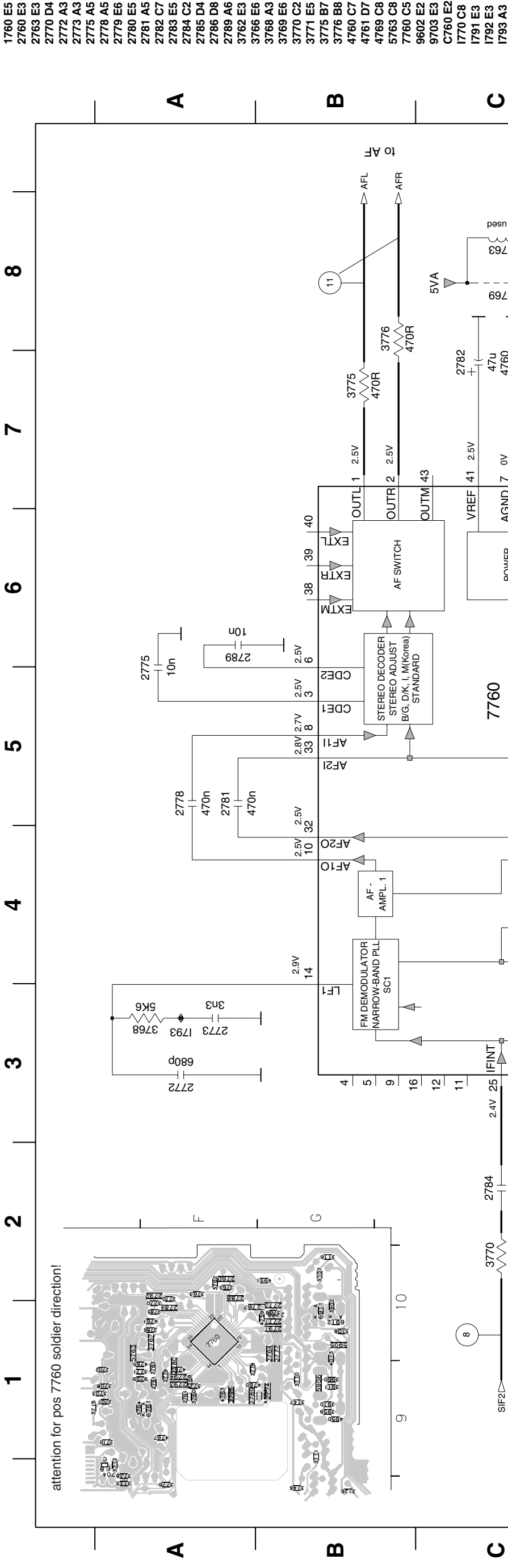
[illegible]

AF page 65
AL page 64
AI01 page 58
AI02 page 57
DE page 59
FM ST page 62
FM NIC page 63
FV page 61
FOME page 70
I/O page 69
PS page 56
VPO page 68
VS page 67
VS_S page 66

7.8 Frontend (FV)



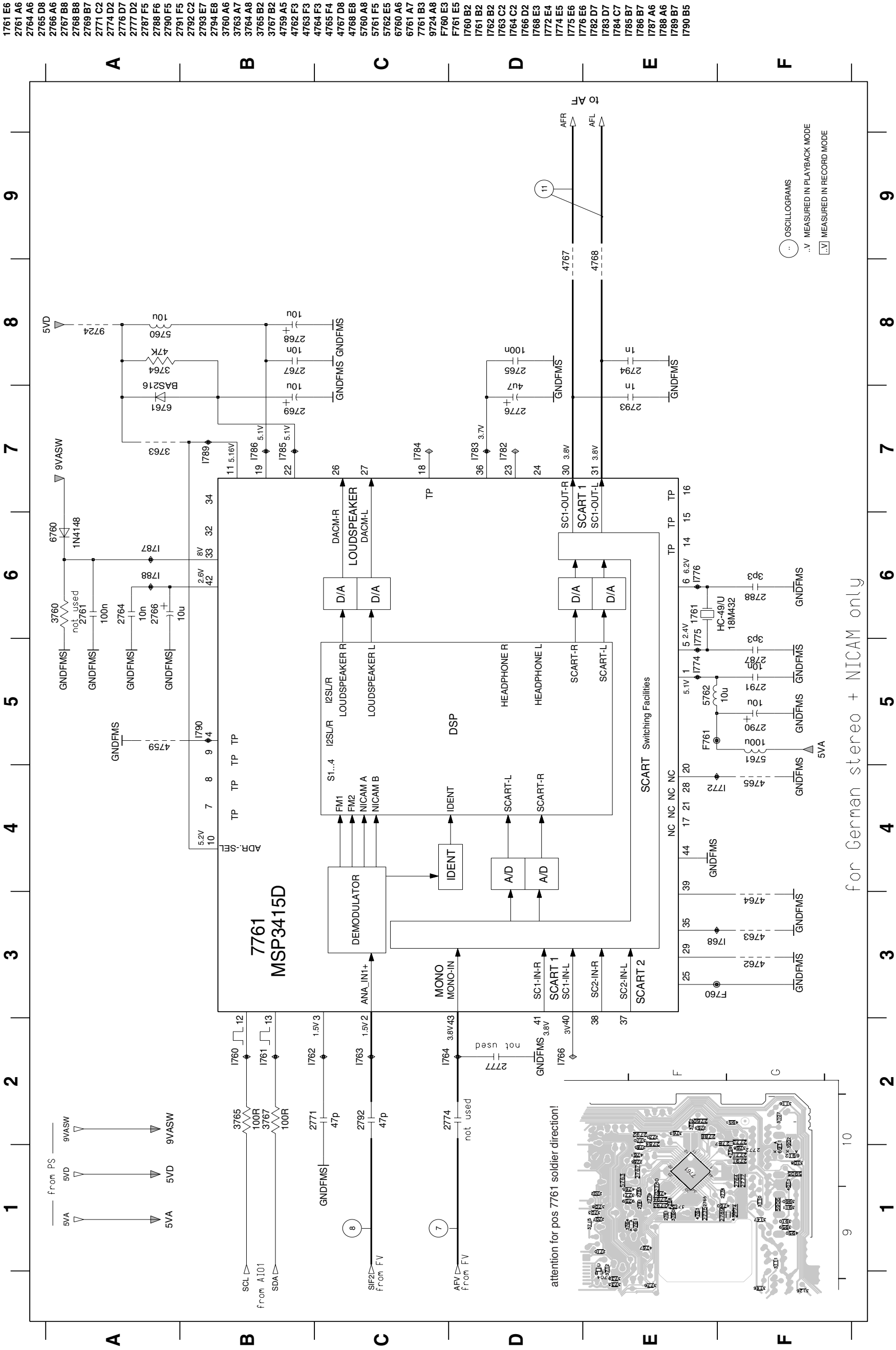
7.9 FM stereo (FM-ST)



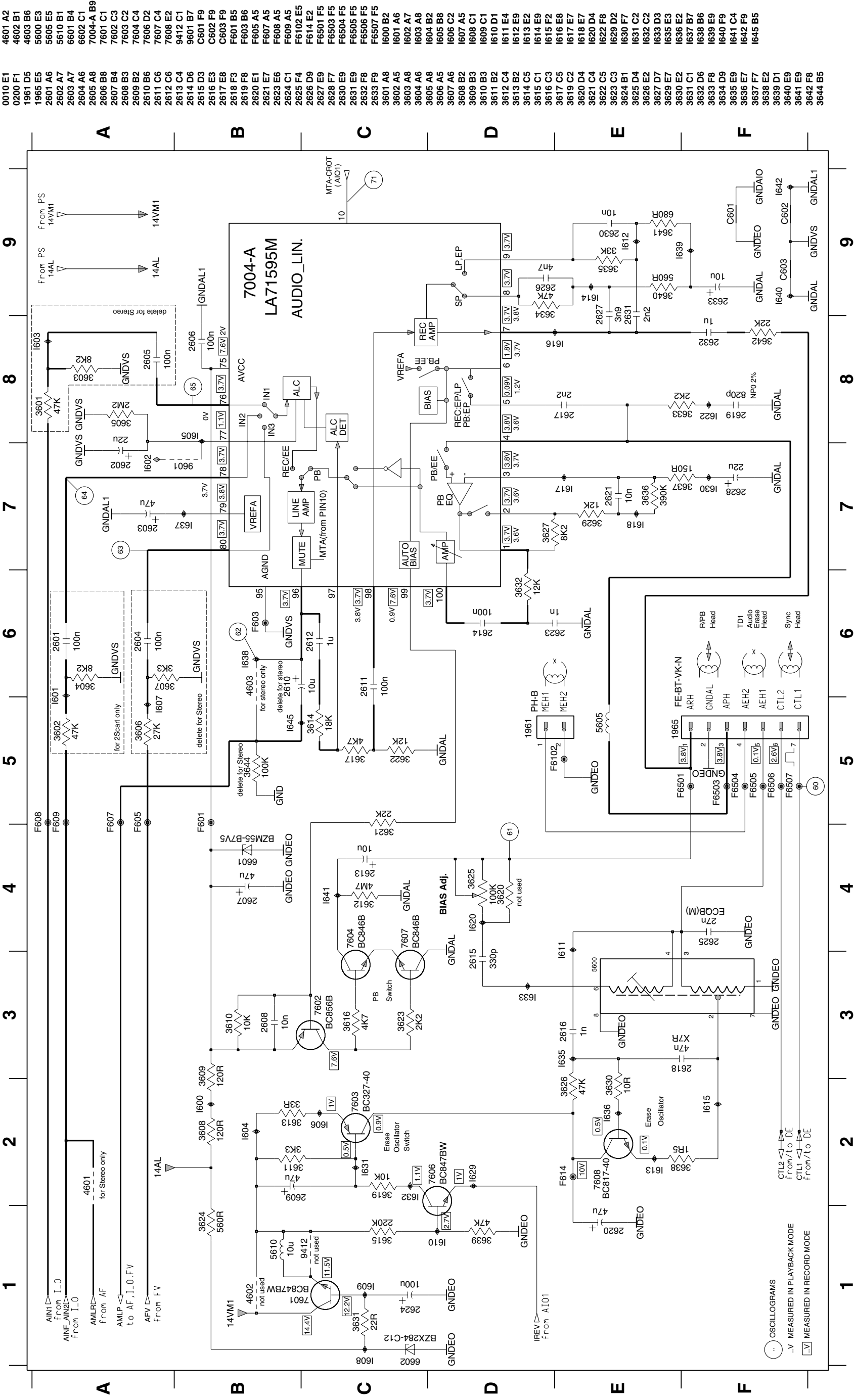
Interconnections:

AF page 65	AL page 64	AIO1page 58	AIO2 page 57	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VPO page 68	VS page 67	VS_S page 66

7.10 FM Stereo + Nicam (FM-ST-NIC)



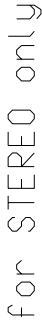
7.11 Audio Linear (AL)



Interconnections:

AF page 65	AL page 64	AIO1page 58	AIO2 page 57	DE page 59	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VS page 67	VS_S page 66

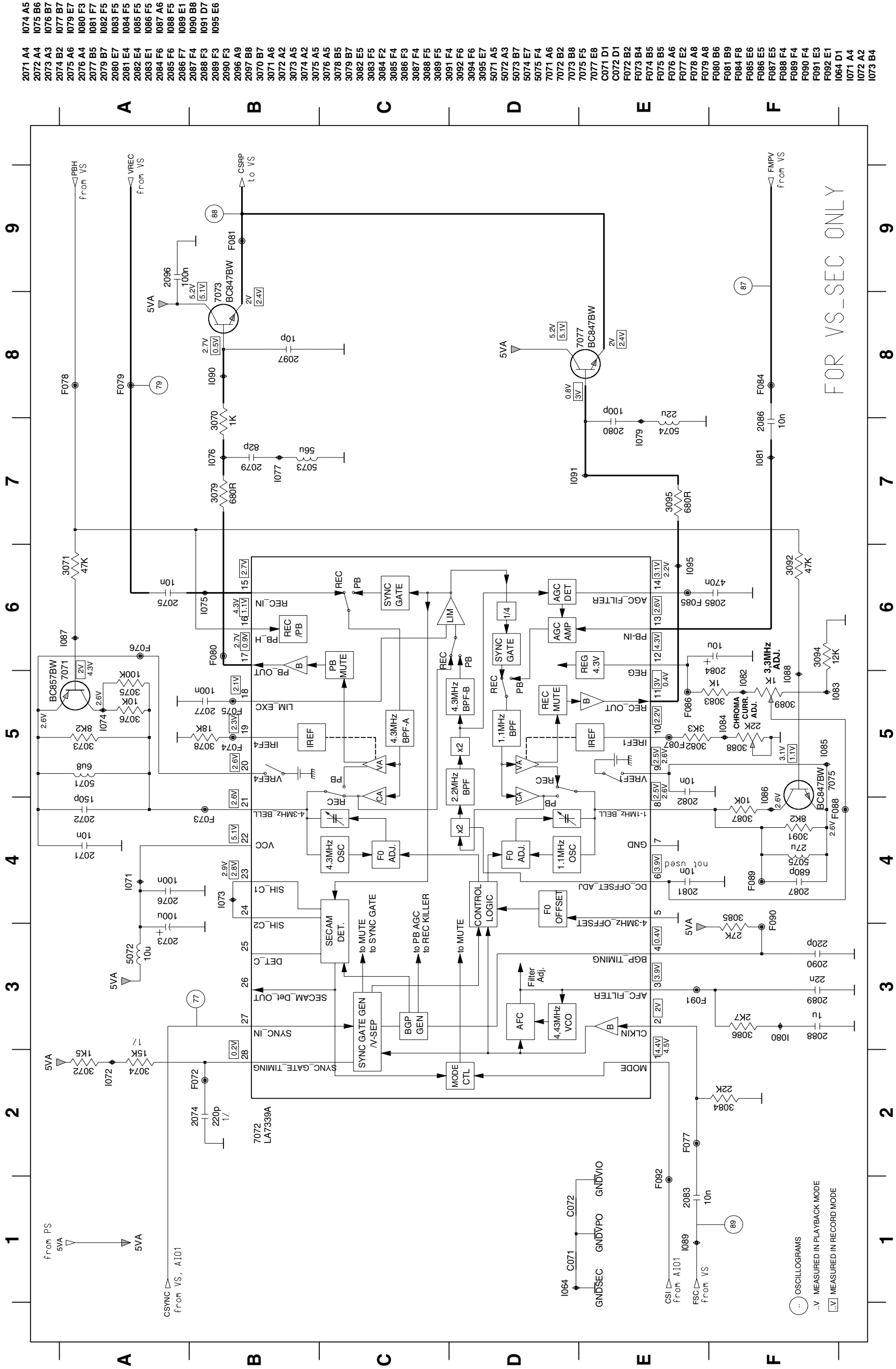
6



AF page 65	AL page 64	AI/O1 page 58	AI/O2 page 57	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VPO page 68	VS page 67	VS_S page 66

AF page 65	AL page 64	AI/O1 page 58	AI/O2 page 57	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VPO page 68	VS page 67	VS_S page 66

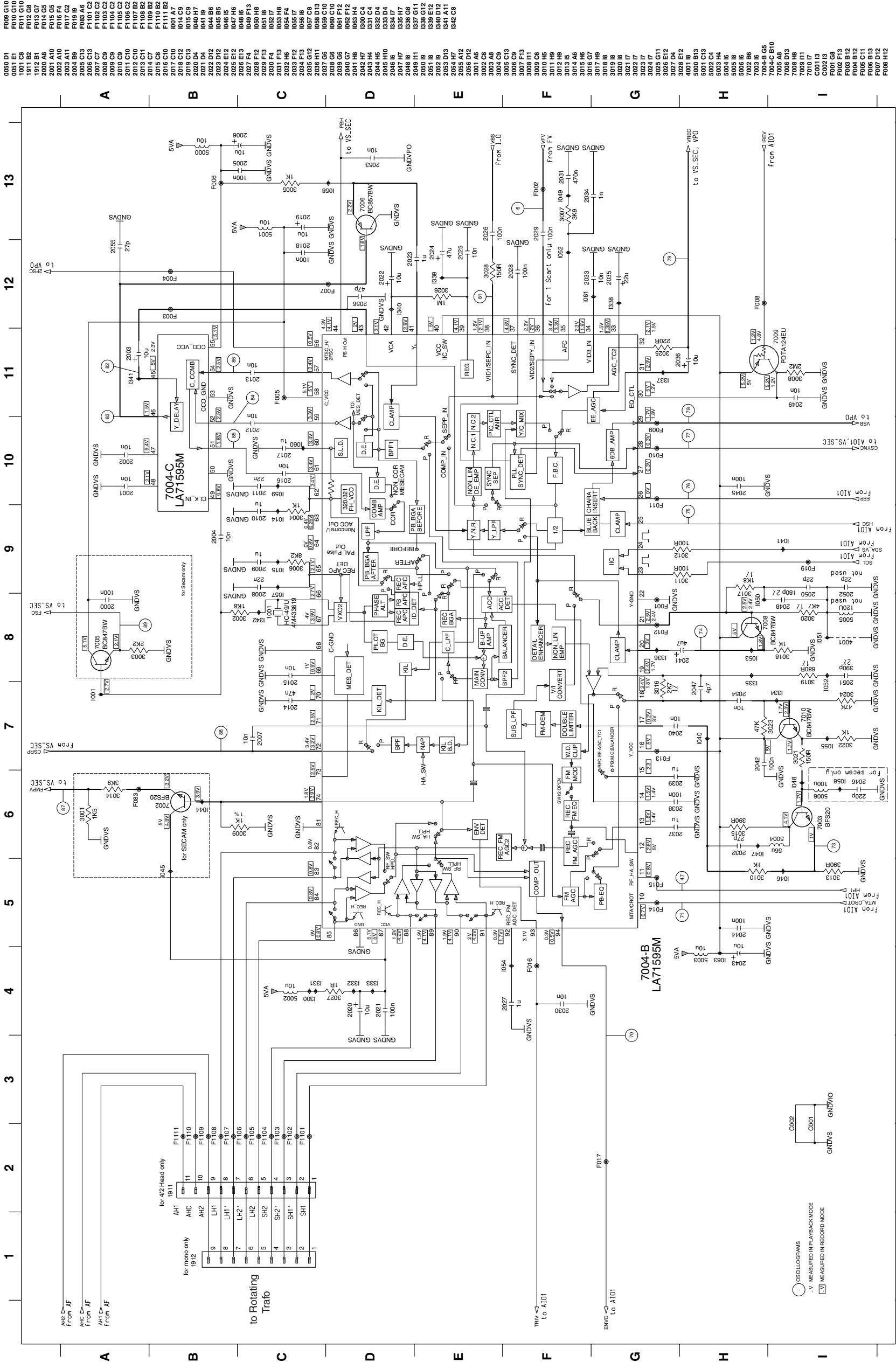
7.13 Video Signal Processing - SECAM (VS-SEC)



Interconnections:

AF page 65	AL page 64	AIO1page 58	AIO2 page 57	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VPO page 68	VS page 67	VS_S page 66

7.14 Video Signal Processing (VS)

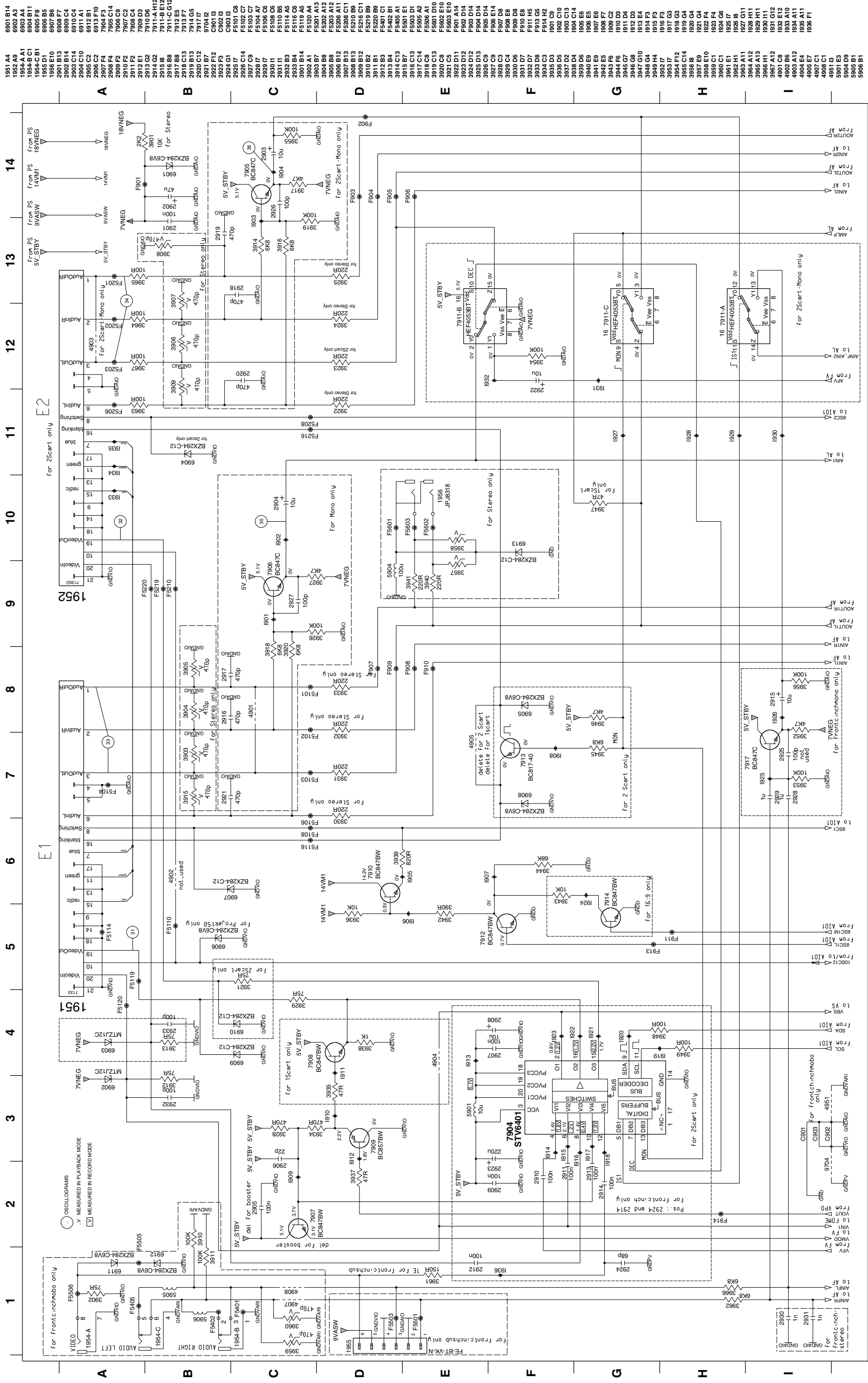


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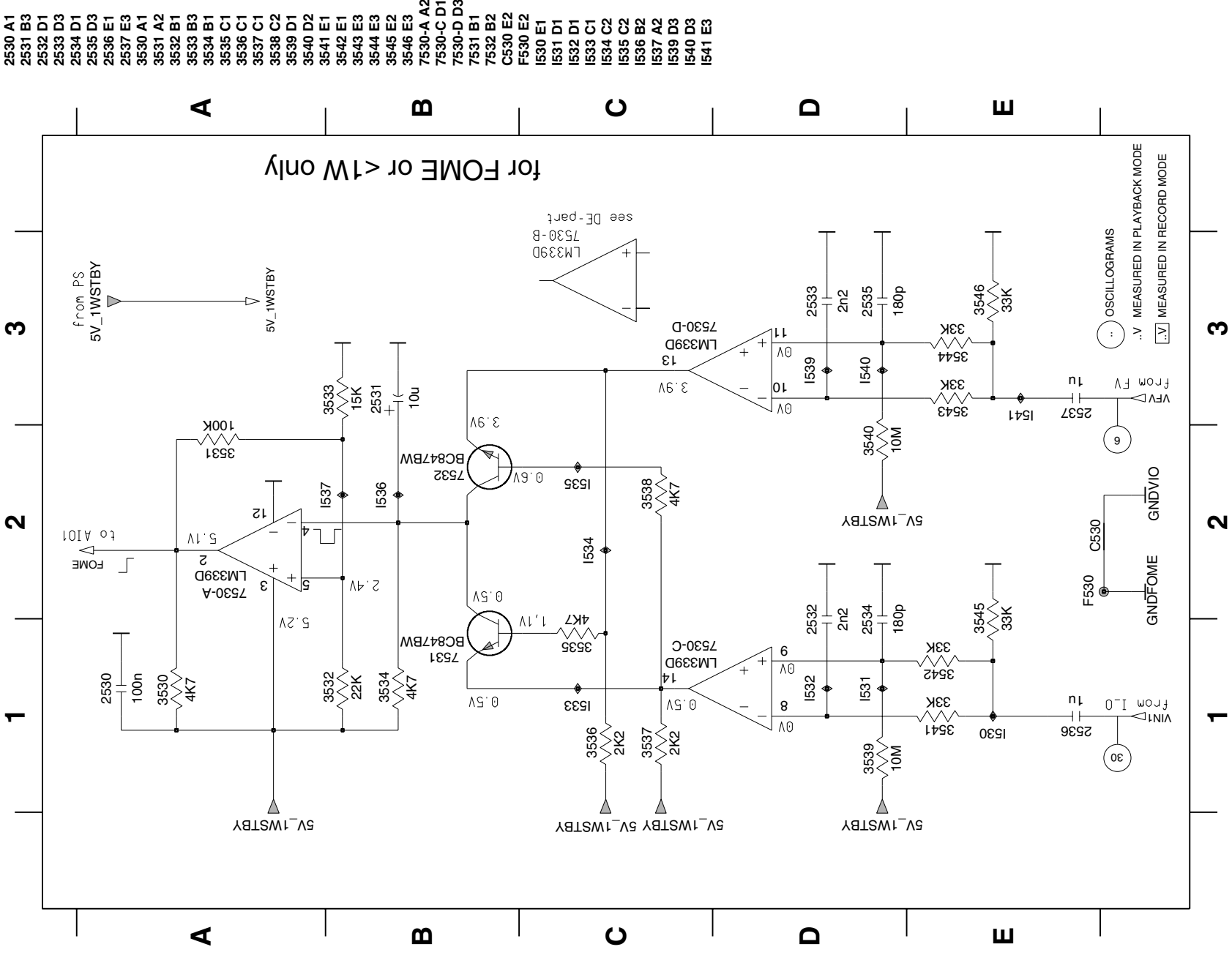
AF page 65	AL page 64	AIO1page 58	DE page 59	FM ST page 62	FM NIC page 63
FV page 61	FOME page 70	I/O page 69	PS page 56	VS page 67	VS_S page 66

7.15 VPS/PDC & OSD Part (VPO)

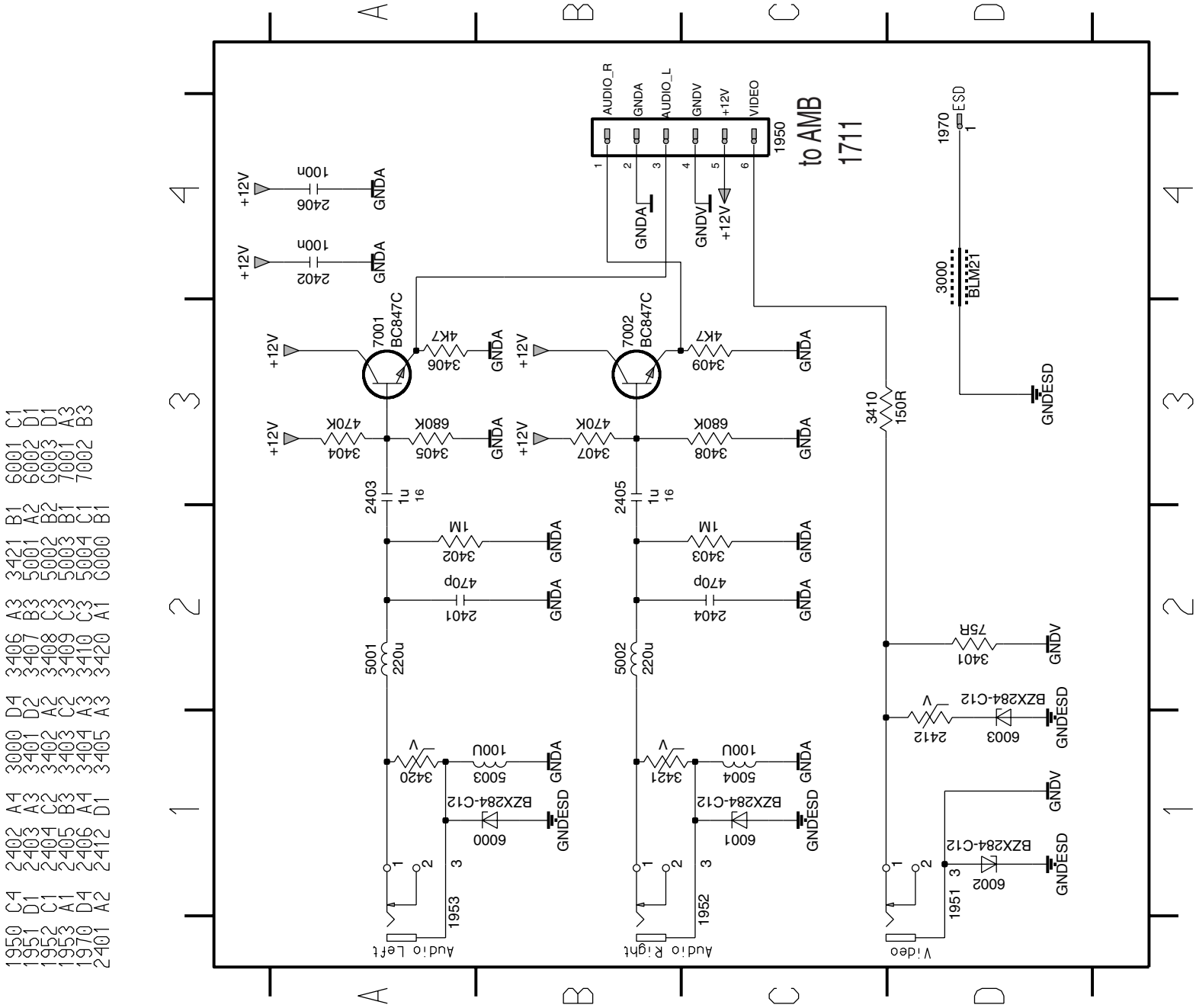
7.16 In/Out Part (IO)



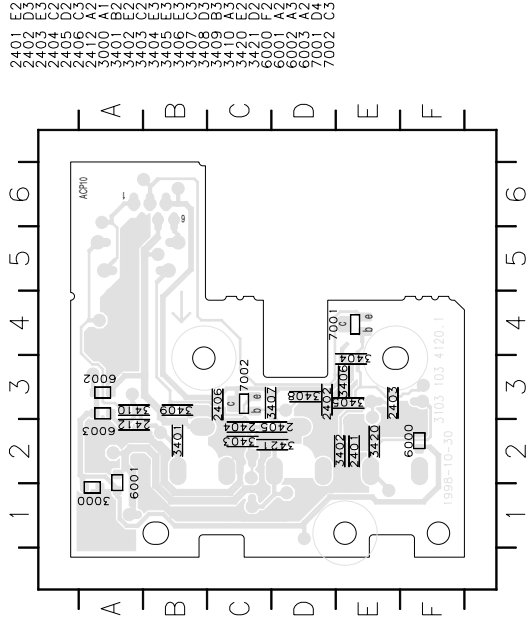
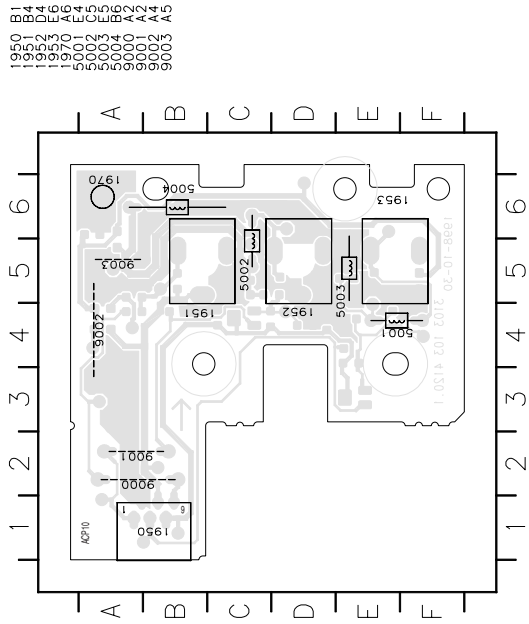
7.17 FOLLOW ME Part (FOME)



7.18 Socket Board (ACP1x)



7.19 Socket Boards (ACP10)



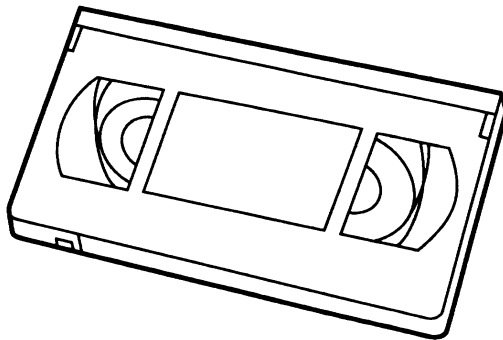
8. Electrical alignments

8.1 Measuring instruments

The following instruments are required to carry out the electrical setting work:

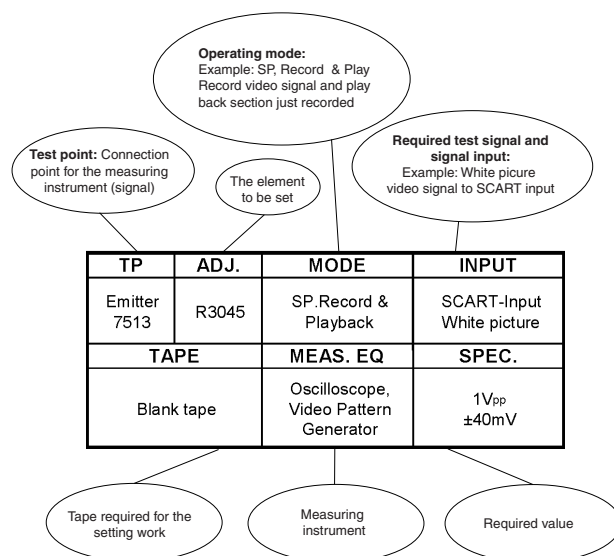
1. Dual trace oscilloscope
 - Voltage range : 0.001 ~ 50V/Div.
 - Frequency range : DC ~ 50 MHz
 - Probe : 10:1; 1:1
2. Digital Multimeter
3. Frequency meter
4. Sine-wave generator : 0 ~ 50MHz
5. Test pattern generator
6. Plastic adjustment tool
7. Isolating transformer (regulating transformer)
8. VHS test cassette 4822 397 30103
SPC test cassette 4822 397 30268

VHS test cassette



Counter Reading Start	0	0040 ±8	0310 ±12
Video	Blank	B&W Pattern	Color Bars
Audio	Blank	6kHz (mono)	40Hz, 3kHz, 15kHz (Mono & Stereo)

8.2 Setting instructions



8.3 Video signal processing (VS-SEC)

Service tasks after replacement of ICs 7004, 7072:

Before commencing adjustment:

Call the service test program and enter Step 10 (Dummy mode). Remove the drive from the motherboard.

8.3.1 3.3 MHz adjustment [3089] (for SECAM)

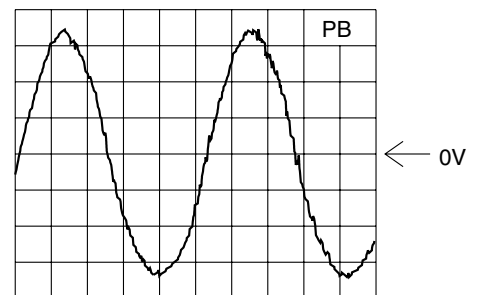
Purpose:

To adjust the mixing oscillator

Consequences of incorrect settings:

Cross patterns in coloured areas, coloured noise.

TP	ADJ.	MODE	INPUT
IC7072 pin 17	R3089	Dummy mode step 10 playback	1.2 MHz sinus 100mVpp, wire 9021 (FMPV)
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope Video pattern generator Sinus generator	adjust to optimum sinus



A: AC, 50mV/Div, 50ns/Div
IC 7072 Pin 17

8.3.2 SECAM chrominance record current adjustment [3088]:

Purpose:

To set the optimum record SECAM chroma level.

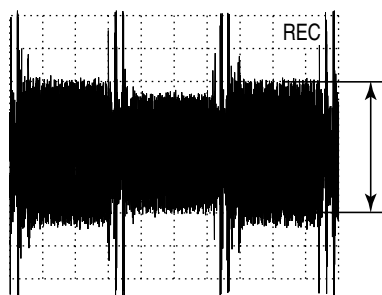
Symptom, if incorrectly set:

If the record level is too high, beats may appear on the picture. If the level is too low, the colour may be degraded.

TP	ADJ.	MODE	INPUT
CSRP pos.9034	R3088	Dummy mode Record Preset E2	(VIDEO IN E2) Red Picture SECAM 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	A=200 ± 15 mV _{pp} ,

Notes:

With varying frame amplitudes, the setting is made for the greatest amplitude.



A: AC, 50mV/Div, 20us/Div

8.4 Front End (FV)

Service tasks after replacement of IC 7705, coil L5702 and TUMOD:

8.4.1 AFC Adjustment:

Purpose:

Correct adjustment of demodulator AFC - circuit

Symptom, if incorrectly set:

Bad or disturbed TV channel reception.

PAL - AFC adjustment [5702]:

TP	ADJ.	MODE	INPUT
IC 7705 Pin 17 (AFC TP9719)	L5702	E to E	38,9MHz 500mV _{pp} at Tuner 1701 Pin 17 (TP9713,ZF-out)
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,2V

SECAM band 1 - AFC adjustment [3730]: (SECAM L / L' only)

Before commencing adjustment:

- Switch to a band 1 SECAM L' preset.
- Is the system switch, in the menu 'MANUAL SEARCHING', not possible, press the right cursor key of the remote in the 'CHANNEL NUMBER' line for a short moment.
- A fine-tuning will be done and the system will switch to the 'AUTO' function.

TP	ADJ.	MODE	INPUT
IC 7705 pin 17 (AFC TP9719)	R3730	E to E, SECAM L' tuned on this preset	33,9MHz 500mV _{pp} at Tuner 1701, pin 17 (TP9713, ZF-out)
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Sinus Generator	2,5V ±0,2V

8.4.2 HF - AGC adjustment [3707]:

Service tasks after replacement of ICs 7705, or TUMOD:

Purpose:

Set amplifier control.

Symptom, if incorrectly set:

Picture jitter if input level is too low and picture distortion if input level is too high.

TP	ADJ.	MODE	INPUT
Tuner 1701 Pin 17 (TP9713, ZF-out)	R3707	Set tuned to channel 27	4,5mV(74dBμV) on aerial input PAL white picture, audio IF on, no modulation
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope Video Pattern Generator	550mV _{pp} +/-50mV (use a 10:1 probe)

8.4.3 Attenuating the 40.4 MHz [5704]: (SECAM only)

Service tasks after replacement of coil 5704:

Purpose:

To attenuate the band I carrier rests.

Symptom, if incorrectly set:

Bad picture quality when the filter attenuates the picture carrier (38.9MHz).

TP	ADJ.	MODE	INPUT
OFW 1704 Pin 1	L5704	E to E	40.4 MHz, 300mV _{rms} at Tuner 1701 Pin 17 (TP9713,ZF-out)
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope, Sinus Generator, Counter	adjust minimum amplitude

If the adjustment is correct the signal at pin 1 of SFW [1704] must be smaller than the input signal amplitude by at least 5 dB.

8.5 Deck electronics (DE)

Service tasks after replacement of IC 7463:

8.5.1 Motor frequency - adjustment [2492]:

Purpose:

To adjust the working frequency of the head motor driver.

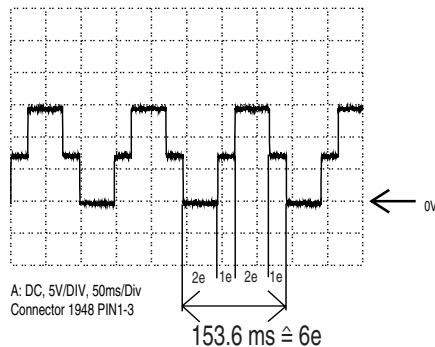
Result of an incorrect adjustment:

Head motor doesn't start correctly.

Before commencing a djustment:

- bring VCR in to EJECT state
- disconnect set from main power source
- remove cable 8004 from connector 1948
- connect test point DRUM [9417] with 5VS1 [9869] (wires on component side)
- reconnect to main power source

TP	ADJ.	MODE	INPUT
Connector 1948 Pin 1	C2492	EJECT	
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope, Counter	153,6 ms \pm 1,5ms see Diagram



8.6 Servo System (AIO1)

Service tasks after replacement of the head drum or EEPROM.

8.6.1 Setting the gap position (GAP):

Purpose:

To determine the correct head switching point during playback.

Symptom if incorrectly set:

Head switching fault and/or vertical picture flickers.

- Enter the service test program and, whilst step display is flashing, enter the step number 51, using the numerical keys.
- Insert a test cassette (e.g. 4822 397 30103) with the standard video signal in the VCR.
- By pressing the SELECT key whilst step 51 is flashing, the automatic adjustment is triggered and stored in the EEPROM.

TP	ADJ.	MODE	INPUT
		Stop Service Mode	
TAPE		MEAS. EQ.	SPEC.
VHS Alignment Tape			Call up Step 51 of Service Mode

After a correct adjustment, the display shows 1;0 when incorrect. To leave the step, press SELECT.



Causes of incorrect adjustment :

Incorrect standard video signal.

Scanner fault.

Microprocessor fault.

8.6.2 "Studio Picture control" adjustment (SPC):

Purpose:

Adjustment of the reference level for the SPC.

Symptom if incorrectly set:

The picture is played back at a lower resolution than would be possible.

TP	ADJ.	MODE	INPUT
		Stop Service Mode	RF or A1- input, black picture without BURST
TAPE		MEAS. EQ.	SPEC.
SPC Alignment Tape			Call up Step 52 of Service Mode

- Video signal via Scart or aerial
- Enter the service test program and, whilst the step is flashing, input the step number 52, using the numerical keys.
- Insert SPC Alignment Tape 4822 397 30268.
- By pressing the SELECT key whilst step 52 is flashing, the recorder makes a recording in SP mode (approx. 10 sec.) and in LP mode (approx. 10 sec.), rewinds and carries out a playback with automatic adjustment.
- After a correct adjustment the display shows 1, and 0 for incorrect adjustments.



To leave the step press SELECT.

8.7 Audio linear - (AL)

Service tasks after replacement of coil L5600, IC7004 or the audio heads:

8.7.1 Adjusting the erasing frequency [5600]:

Purpose:

To set the correct recording erasing frequency.

Symptom, if incorrectly set:

Erasing frequency or its harmonics cause audio faults.

TP	ADJ.	MODE	INPUT
connector 1965 pin 5	L5600	Record E1	PAL white picture, with sound on E1 (1kHz or 10kHz)
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Frequency Counter	70kHz \pm 10kHz

8.7.2 Adjustment of bias current [3625]:

Purpose:

To set the optimum record bias current.

Symptom, if incorrectly set:

If the audio level is too high, the higher frequencies of the linear sound are too low.

If the level is too low, the higher frequencies are too strong and sound distortions increase.

TP	ADJ.	MODE	INPUT
C2613 (TP BIAS)	R3625	Record E1	PAL white picture, with sound on E1 (1kHz or 10kHz)
TAPE	MEAS. EQ.	SPEC.	
Blank Tape	AC Millivoltmeter, Oszilloskop, Video Pattern Generator	14V _{RMS} ± 1V _{RMS} (70kHz)	

Checking the 'bias' adjustment:

Apply a sine-wave signal with an amplitude of 50mV_{eff} to the SCART audio input. Record the 1kHz signal and 10kHz signal for 30 seconds each. Play back the recording and check that the amplitude difference is in the ±3dB range. If this is not the case, correct the value for the magnetic biasing current. If the treble is too low, the bias current should be reduced slightly. If the distortion is too great, the bias current should be increased slightly.

(approximate value: +1V = -1dB Treble).

8.7.3 Adjustment of the audio linear playback amplitude [IIC-bus]:

Purpose:

To set audio part amplification LA71595 [7004-A]

Symptom, if incorrectly set:

Playback sounds too low or too loud.

Enter the service test program and, whilst step display is flashing, enter the step number 62, using the numerical keys.

TP	ADJ.	MODE	INPUT
Pin 1 of Scart 1 (Audout)	refer to description	SP Self-recording and Playback, Service mode call up Step 62	(Video white picture) Audio in Scart 1, 700mV _{RMS} , 1kHz
TAPE	MEAS. EQ.	SPEC.	
Blank Tape	AC Millivoltmeter, Video Pattern, Frequency Generator	500mV _{RMS} ±50mV	

By pressing the SELECT button whilst step 62 is flashing, the output select is switched to Mono and the display shows, for instance:



- Make a recording of the audio signal on E1.
- Connect the millivoltmeter to Scart1 Pin1 (Audio out) and play the recording back.
- The level on Scart 1, Pin1 (Audio out) can be adjusted to the set value by pressing the UP (value increases) or DOWN keys (value decreases).
- (The amplitude changes by 1 dB each time the key is pressed).
- The range is shown in the display by the numbers 0...31.

- The value is automatically stored in the EE-PROM each time the button is pressed.

8.8 Display Control (AIO2)

Service tasks after replacement of the clock quartz [1170] or the EEPROM:

8.8.1 Clock frequency output

Purpose:

Setting the exact clock function.

Symptom, if incorrectly set:

The clock is too fast or too slow.

Remove the Motherboard from the frame and bring it into the service position.

Enter the service test program and, whilst step display is flashing, enter the **step number 99**, using the numerical keys.

TP	ADJ.	MODE	INPUT
7899-A pin 71 CLOCK ADJ.		Stop Service Mode call up Step 99	
TAPE	MEAS. EQ.	SPEC.	
	Frequency counter with 6 digits	refer to description below	

After entering with SELECT, the display is switched off and the watch symbol is flashing, no further function can be carried out. At the CLOCK ADJUST measuring point [7899-A, pin 71], the uncorrected clock frequency of approx. 8192 Hz is always output.

Measure the output frequency with the calibrated counter (minimum resolution of 6 digits) and note down the value (f_{mess}).

Determining the deviation (in ppm):

f_{mess} measured frequency

f_{nom}target frequency (8192,00 Hz)

$$\text{Deviation} = 1 \times 10^6 \times (f_{\text{mess}} - f_{\text{nom}}) / f_{\text{nom}}$$

Determining the correction value for Step 53:

Correction value = Deviation / 0.763 + 128 (round off to whole number)

The calculated **correction value** must be between 0 and 255 (change quartz otherwise), and must be entered in Step 53 and saved.

This step can either be exited by performing a main power source reset, after which the service program must be entered again **or by pressing any key on the set**, before step 53 can be entered.

Example:

$$f_{\text{mess}} = 8191.97 \text{ Hz} \quad f_{\text{nom}} = 8192.00 \text{ Hz}$$

$$\text{Deviation} = 1 \times 10^6 \times (8191.97 - 8192.00) / 8192.00 = -3.662$$

$$\text{Correction value} = -3.662 / 0.763 + 128 = 123.20 = 123$$

8.8.2 Inputing the clock correction

Before carrying out step 53, the correction value must be established in step 99.

By pressing the SELECT key whilst **step 53** is flashing, the display shows, for instance (128 is the default value of an empty EEPROM):



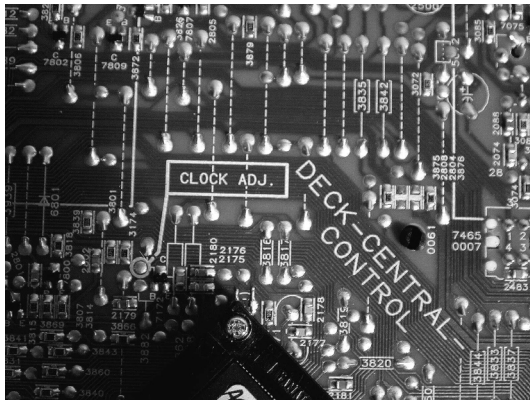
Using the numerical keys of the remote control, the established correction value from **Step 99** is entered as a 3-digit number (value must be between 0 and 255).

After pressing the OK key on the remote control, the entered code is stored, the display shows OK for approx. 3 seconds and then the stored value in decimal format.



In case of an invalid entry (value >255), the activation of the OK key causes the content of the last stored value to be displayed and OK does not appear in the display.

To leave the step press Select.



Adjustment table of the clock frequency:

Measured frequency in Hertz:

measured clock frequency pos. 7899-A pin 71 [Hz]	corrected value for Step 53 input	Time deviation minutes / year
8192,00	128	0,0
8191,98	125	-1,2
8191,96	122	-2,4
8191,94	118	-3,7
8191,92	115	-4,9
8191,90	112	-6,1
8191,88	109	-7,3
8191,86	106	-8,5
8191,84	102	-9,8
8191,82	99	-11,0
8191,80	96	-12,2
8191,78	93	-13,4
8191,76	90	-14,6
8191,74	86	-15,9
8191,72	83	-17,1
8191,70	80	-18,3
8191,68	77	-19,5
8191,66	74	-20,8
8191,64	70	-22,0
8191,62	67	-23,2
8191,60	64	-24,4
8191,58	61	-25,6
8191,56	58	-26,9
8191,54	54	-28,1
8191,52	51	-29,3
8191,50	48	-30,5
8191,48	45	-31,7
8191,46	42	-33,0
8191,44	38	-34,2
8191,42	35	-35,4
8191,40	32	-36,6
8191,38	29	-37,8
8191,36	26	-39,1
8191,34	22	-40,3
8191,32	19	-41,5
8191,30	16	-42,7
8191,28	13	-43,9
8191,26	10	-45,2
8191,24	6	-46,4
8191,22	3	-47,6
8191,20	0	-48,8

measured clock frequency pos. 7899-A pin 71 [Hz]	corrected value for Step 53 input	Time deviation minutes / year
8192,00	128	0,0
8192,02	131	1,2
8192,04	134	2,4
8192,06	138	3,7
8192,08	141	4,9
8192,10	144	6,1
8192,12	147	7,3
8192,14	150	8,5
8192,16	154	9,8
8192,18	157	11,0
8192,20	160	12,2
8192,22	163	13,4
8192,24	166	14,6
8192,26	170	15,9
8192,28	173	17,1
8192,30	176	18,3
8192,32	179	19,5
8192,34	182	20,8
8192,36	186	22,0
8192,38	189	23,2
8192,40	192	24,4
8192,42	195	25,6
8192,44	198	26,9
8192,46	202	28,1
8192,48	205	29,3
8192,50	208	30,5
8192,52	211	31,7
8192,54	214	33,0
8192,56	218	34,2
8192,58	221	35,4
8192,60	224	36,6
8192,62	227	37,8
8192,64	230	39,1
8192,66	234	40,3
8192,68	237	41,5
8192,70	240	42,7
8192,72	243	43,9
8192,74	246	45,2
8192,76	250	46,4
8192,78	253	47,6

9. Circuit descriptions and List of abbreviations

9.1 Switched-mode power supply PS (PS Part)

9.1.4 Start-up with Mains-on:

9.1.1 Technical data:

Mains voltage	: 195-264 Vrms
Maximum output	: 15W / 40W (continuous / maximum output)
Operating frequency	: 40 kHz
Efficiency	: approx. 75 % at maximum output

Six different direct voltages are supplied on the power supply outputs.

9.1.2 Functional principle:

This power supply functions in a similar way to a blocking oscillator. In the supply voltage part [1300 to 2318], the mains voltage is rectified and buffered in the capacitor [2318]. From this direct voltage [2318] energy is transferred into the transformer [5301, pins 1-3] during the conductive phase of the switching transistor [7302] and is stored there as magnetic energy. This energy is passed to the secondary outputs on the power supply in the blocking phase of the switching transistor [7302]. With the switch-on time of the switching transistor [7302], the energy transferred in every cycle is regulated in such a way that the output voltages remain constant regardless of changes in the load or input voltages. The power transistor is activated using the integrated switch [7303] Fig.1.

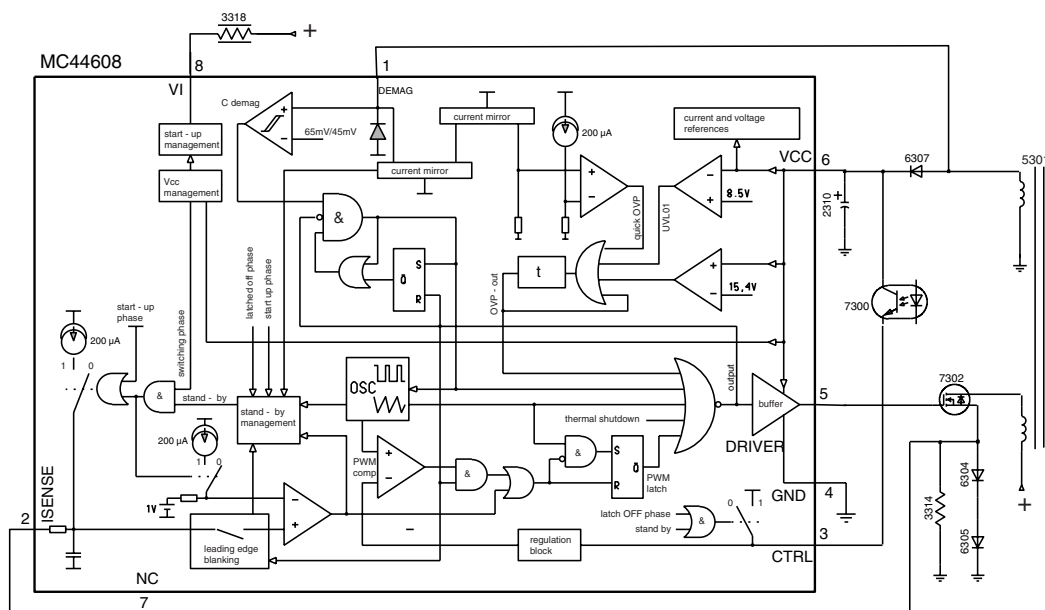
9.1.3 Supply voltage part

The supply voltage part extends from the mains socket [1300] to the capacitor [2318]. Using the diodes [6310, 6311, 6312 and 6313] the a.c. supply voltage is rectified and buffered using the capacitor [2318]. The line reactor [5305] and capacitor [2316] create a filter to keep interference arising in the power supply away from the mains. Components [1302], [3326] and [3323] protect the power supply against short-term overvoltages in the mains, e.g. caused by indirect effects from lightning.

Following connection to the mains, the capacitor [2310] is loaded via the start-up resistor [3318] and a current source between pin 8 and pin 6 on the IC [7303]. Once the voltage on [2310] and therefore the supply voltage V_{CC} on the IC [7303] has reached approx. 13V, the IC starts up and issues pulses to its output on pin 5. These pulses are used to control the gate on the power transistor [7302] (see Fig.2). The frequency has a fixed setting in the IC (approx. 40 kHz). The current input on the IC is approx. 5 mA in normal mode. If V_{CC} drops to below approx. 10V (e.g. with power limitation) or if V_{CC} exceeds around 15V (interruption of the control loop), the output on the IC [7303, pin 5] is blocked. All output voltages on the power supply, and therefore also V_{CC} , decrease. Once V_{CC} has dropped to below approx. 6.5V, a new start-up cycle begins. (See also "Overload, Power Limitation, Burst Mode" section)

9.1.5 Normal mode:

With the power supply in normal mode, the periodic sequences in the circuit are divided primarily into the conductive and blocking phase of the switching transistor [7302]. During the **conductive phase** of the switching transistor [7302], current flows from the rectified mains voltage to the capacitor [2318] through the primary coil on the transformer [5301, pins 1-3], the transistor [7302] and resistors [3314, 3331] to earth (see Fig.1). The positive voltage on pin 1 of the transformer [5301] can be assumed to be constant for a switching cycle. The current in the primary coil on the transformer [5301] increases linearly in the pattern of $U=L \cdot di/dt$. A magnetic field representing a certain volume of the primary current is formed inside the transformer. In this phase, the voltages on the secondary coils are polarised in such a way that the diodes [6300, 6301, 6306, 6308 and 6309] block. From the controller on [7301], a current is supplied to the CTRL input on the IC [pin 3, 7303] via optocoupler [7300]. Once the switch-on time for the switching transistor [7302] has been reached, which corresponds to the current supplied on the CTRL input, the switching transistor is switched off.



Once the switching transs been switched off, the **blocking phase** begins. No more energy will be transferred into the transformer. The inductivity of the transformer will still attempt to maintain the current which has flowed through it ($U=L \cdot di/dt$) at a constant level. As the primary current circuit is interrupted by the shut-off switching transistor [7302], the current will flow through the secondary coils.

The polarity of the voltages on the transformer is reversed, which means that the diodes [6300, 6301, 6306, 6308 and 6309] become conductive and current flows into the capacitors [2301, 2305, 2309, 2311 and 2312] and the load. This current is also ramp-shaped (di/dt negative, therefore decreasing).

The **control adjustment** for the switched-mode power supply is made by changing the conductive phase of the switching transistor (see Fig.2), so that either more or less energy is transferred from the rectified mains voltage to [2318] in the transformer. The control information is provided by the control element [7301]. This element compares the 5V output voltage via the voltage dividers [3300, 3306, 3336] with an internal 2.5V reference voltage. The output voltage from [7301] passes via an optocoupler [7300] (for the metallic isolation of the primary and secondary parts) as the current value to pin 3 on the IC [7303]. The switch-on time for the switching transistor [7302] is inversely proportional to the value of this current.

9.1.6 Overload, power limitation, burst mode:

With an increasing load on one or more power supply outputs, the switch-on time for the power transistor [7302] also increases, and thus also the peak value of the delta-shaped current through this power transistor. The equivalent voltage circuit for this current profile is passed from resistors [3314] and [3331] via [3312] and [3347] to pin 2 on the IC [7305]. If the voltage on pin 2 reaches 1V in one switching cycle, the conductive phase of the switching transistor is ended immediately. This check is made in each individual switching cycle. This process ensures that no more than approx. 48W can be taken out of the mains (= **power limitation**).

If the power supply reaches the power limit, the output voltages and the supply voltage V_{cc} on pin 6 of the IC [7303] will be reduced following further loading. If V_{cc} is less than approx. 10V at any point during this process, the output on the IC [7303, pin 5] is blocked. All output voltages and V_{cc} are reduced. Once V_{cc} has dropped to below approx. 6.5V, a new start-up cycle begins. If the overload status or short-circuit remains, the power limitation will be activated immediately and the voltages will continue to be reduced, followed by another start-up attempt (**Burst Mode**). The amount of power taken up from the mains in burst mode is low.

9.1.7 Standby mode:

In the 'Standby' operating mode on the device, the 'STBY' control line is used to shut off the output voltages 14AL, 5VA and 5VD on the power supply to minimise the amount of power taken up from the mains. The supply to the display heating can also be switched off using the '1WSTBY' control line. The power supply itself will continue to function continuously in the 'Standby' operating mode with a switching frequency of 40kHz.

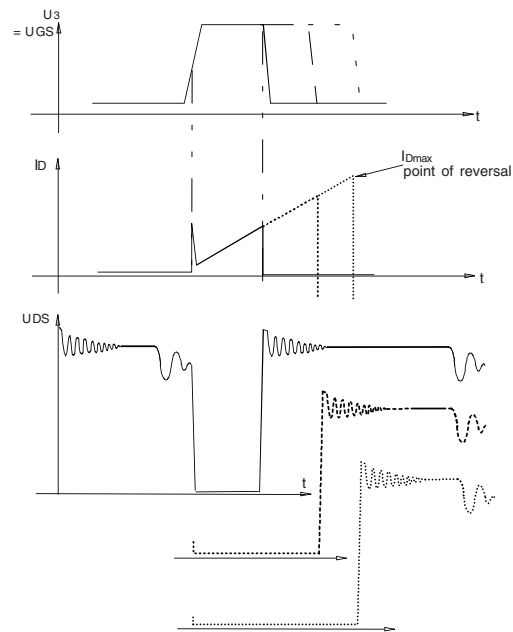


Figure 9-1

9.2 Operating unit DC (DC part)

The microcontroller TMP93CT76F [7899-A] is a 16 bit microcontroller fitted with 128Kb ROM and 2.5Kb RAM. It is the core element of the operating unit, fulfilling the following tasks with the respective functional groups:

- Integrated VFD driver
- Timer
- Evaluation of the keyboard matrix
- Decoding the remote control commands from the infra-red receiver pos. 6170
- Activation of the display
- Back-up mode

In normal operation, the P is operated in dual-clock mode, i.e. both quartzes [1170, 1171] oscillate. The time is derived from the slow quartz [1170] (32.768 kHz), and the fast quartz [1171] (16MHz) is used to generate the system clock frequency.

In case of a mains failure (back-up mode) the P is not reset, but instead the mains failure is registered by the IPOR interrupt 3 [7899-B] (pin 67) and the P is moved into "Sleep mode" (low power consumption). The 16MHz quartz is turned off and the 32kHz quartz is then used as the clock and system clock frequency. The operating voltage for the AIO is buffered by a back-up cell [pos. 2174, 2172]. A diode [6171] prevents this gold capacity from discharging.

9.3.3 CMT detection (video detection with CSYNC)

This has been extended due to identification problems with weak transmission signals and video signals not conforming to the STANDARD (common channel interference). The CSYNC line is supplied to the μP [7899-B] on pin 50. A hardware integration [7807,7808,7809] of the video pulse compensates the interference generated by the common channels and weak signals.

9.3.4 EE-PROM

The EE-PROM [7818] is a non-volatile memory which can be erased and written to electrically. (Data remains even if the operating voltage fails). Data specific to the device such as the X distance, head changeover position, preset stations, optional bytes etc. is stored in the EE-PROM [7818]. The data is accessed by the μP via the I^2C bus.

9.3.5 Easy link (P50)

For the communication between the TV set, video recorder and the peripheral devices, a bi-directional single-wire bus is used, which runs via pin 10 to scart socket 1.

The output signal is generated on pin 84 of the μC [7899-B], pin 68 is the signal input.

9.3.6 Shuttle

The shuttle is connected to the motherboard on plug pos.1982. It is a binary coded rotary switch with a rotation angle of +/- 70 degrees and 16 switch positions. These are input and evaluated via four lines (shuttle b1 - shuttle b4) to the input ports P24 - P27 [7899B pins 2-5].

9.3.7 Satmouse

For activating a sat-receiver via an external infrared electronic transmission unit (Satmouse) a bi-directional data line, a short-circuit proof +5V and earth are provided via a 3-pin 3.5mm jack [1941].

The +5V is limited to approx. 140 mA using a current limiting switch [7812 and peripherals].

9.4 Deck electronics DE (DE part)

The deck interface IC MP63100FP [7463] contains the following functional groups:

- CTL stage (tape synchronisation)
- Sensor interface
- Power on reset
- Head drum motor driver
- Loading motor driver
- Capstan motor control

9.4.1 CTL stage

The IC M63100FP [7463] contains a read/write stage for the CTL track with the option of overwriting an existing CTL track without any interference. The playback stage is fitted with a "digital" five-stage AGC. This logic circuit identifies the size of the output signal supplied by the CTL head, and then selects the best amplification ratio in the playback stage using comparators.

The CTL head voltage can therefore vary greatly, if V_{max} / V_{min} is great. The slowest tape speed is in LP mode. The fastest speed is adjusted during rewind. To ensure that the duty cycle in the tape sync is always reproduced correctly in the conditions mentioned above (important for detecting VISS marks), the amplifier must not be overdriven.

The five-stage AGC alone cannot cover the large dynamic range of the input voltage. The amplifier is therefore also equipped with a low pass characteristic ($f_g = 3\text{kHz typ.}$; internal).

In parallel with the CTL head is the RC cell comprising capacitor [2479] and resistor [3471]. The capacitor [2479], together with the CTL head inductivity, causes a resonance step-up at around 10 kHz and the resistor [3471] suppresses this step-up. This creates an aperiodic transient response in the resonance. Beyond the resonance frequency, there is an adjustment in terms of a steep fall in the frequency transmission characteristic. This effectively suppresses high-frequency pick-ups. The CTL head signal amplitude in standard play is around 1mVp (typ.) which means that the amplification for the playback amplifier must be correspondingly high. To avoid offset problems, a 100 F electrolytic capacitor [2490] is fitted in the negative feedback branch for DC decoupling.

The polarity of the playback amplifier can be changed using the Video Index Search System (VISS) voltage. This is the only way in which the P can write a VISS mark on the tape without spikes. The Write/Read (W/R) signal is used to switch over between record and playback:

W = "H", R = "L".

9.4.2 Power on reset (POR) generator

The POR generator contained in the M63100FP [7463] requires only one external capacitor [2477], which specifies the length of the POR pulse. For 33 nF, t_{POR} is approx. 30ms. The response threshold of the reset circuit is between 4.5 and 4.8 V. Supply fluctuations which are shorter than t_{POR} / 100 area and which do not fall below 4.0 V, do not trigger the POR. The P is reset using the inverted POR.

9.4.3 The sensor interface :

The four comparators in the M63100FP [7463] are used to convert sensor signals to the logic level. The outputs are overload protected by a current limiter and thermal overload protection. Only the non-inverting input on each comparator is accessible from the outside. The other inputs are connected to an internal reference of 2.5V. The fixed hysteresis of the comparators of approx. 18 mV is also located internally.

The comparators are connected as follows:

Comparator 1: In = FTA, pin 39; Out = FTAD, pin 34:
FTA = threading tachometer. This signal comes from a forked light barrier in the deck. An infra-red light beam is interrupted by a 4-blade impeller (butterfly). The output amplitude for the light barriers should be less than 2V for the low level and greater than 3V in the high level to ensure a correct evaluation process. An additional hysteresis is created with a resistor [3476]. For unit versions <1W and FOME the external operation amplifier [7530B] is used to reduce the power consumption in <1W mode.

Comparator 2: In = WTR, pin 38; Out = WTRD, pin 33:
WTR = Winding tachometer right, from a reflection photoelectric barrier. The level is the same as for the FTA.

Comparator 3: In = WTL, pin 37; Out = WTLD, pin 31 :
WTL = Winding tachometer left, from a reflection photoelectric barrier. The level is the same as for the FTA.

Comparator 4: In = FG, pin 35; Out = FGD, pin 30:
FG = capstan tachometer. This signal stems from an amplifier for the tachometer hall sensor on the motor unit [1946 pin 4]. The output impedance is 10 kOhm. The amplitude of the virtually sinusoidal signal is normally 1 Vp. It should not fall below 300 mVpp. It is AC-coupled via a capacitor [2485]. In order for a bias current to flow, the input

pin 31 must be passed via a resistor [3474] to the reference voltage on pin 4. A capacitor [2480] for filtering out high-frequency interference is arranged in parallel to the bias resistor.

9.4.4 Interface to the head drum motor driver part

The head drum control voltage (speed and phase control information) is output via a P-output (7899-B pin 35; PWM 14-bit). This pulse-wide modulated signal is fed to the motor driver IC M63100FP [7463 pin 11] and integrated with the capacitor [2469]. This IC already has a completely integrated 'start-up' circuit fitted. For the commutation, the head drum motor driver uses the e.m.f. on the non-current carrying motor coil (transformer principle). The motor speed is also discharged from there at the same time. The phase of the head disc is discharged from a position coil. The speed and phase are multiplexed into one signal [7463 pin 6] and output, which means that the falling edge of the signal is available with a positive edge for the speed (FG/450Hz) and at 25Hz for the position pulse (PG).

The motor driver M63100FP [7463] is connected to the head drum motor on the motherboard using plug [1948].

- DRUM is the speed-phase control signal. The resolution is 14 bit.
- PG/FG is the combined POS/tachometer signal from the M63100FP [7463].

9.4.5 Interface to the loading motor driver part:

The loading motor driver part is constructed for use as a bridged dual power operations amplifier (OPAMP). It can supply max. $\pm 0.8A$ output current. The output current is limited to approx. $0.7A$ by the internal resistance of the loading motor (18 Ohm typ.) (start-up or motor is blocked). Between the IC outputs [7463, pins 22 and 24] there is a "Boucherot" circuit [3467] 1E, [2474] 100 nF for suppressing a spurious 3MHz oscillation from the output stage. One half of the bridge is controlled via the TMO line on pin 27 and acts as a comparator. The other half is an amplifier integrator with a 3.9 gain. A change in the input voltage (THIO) of between 0 and 5V on pin 25 results in a change in the output voltage of between 0V and almost U_b . With 50% modulation (THIO = 2.5 V) pin 24 has approx. 7 V. The 100nF capacitor [2473] in the negative feedback of the op-amp filters out the PWM frequency of approx. 39kHz. During POR, the P issues "L" to the THIO line, whilst TMO is "H". This ensures that no current flows in the motor for the duration of the POR pulse. This prevents the motor being destroyed in case of prolonged running or blockage. This arrangement also has a disadvantage, however. This is that if the 5 V supply fails (e.g. because the 5V fuse has blown), residual voltages may be passed to the IC inputs via the adjacent 14 V voltages. These residual voltages trigger the comparator and the op-amp in opposite ways, causing a short-circuit in the blocked loading motor after about a minute. To get around this problem, a separate voltage divider is used internally for the comparator. Both outputs on the M63100FP [7463] are then in "common mode" if this error occurs.

9.4.6 Interface to the capstan motor

The driver IC on the capstan motor is activated via connector [1946].

CAP is the signal for the capstan speed. This voltage may vary without load between 0 and 5 V.

The rotational direction of the motor is determined using CREV (capstan reverse). The maximum current input for the motor is limited to 1A. Typical values in PLAY mode are 0.2 ... 0.3 A.

9.5 Front end FV (FV part)

9.5.1 The front end comprises the following parts :

- TUMOD = Tuner(+ Modulator Option)(+BoosterOption) (+Passive Loop Through Option)
- IF amplifier & video demodulator IC TDA 9817, [7705] with FM - PLL demodulator
- IF amplifier & video demodulator IC TDA 9818, [7705] with FM - PLL and AM demodulator
- FM stereo decoder TDA 9873 [7760]
- Multi-standard FM stereo, AM, NICAM decoder MSP3415D [7761]

9.5.2 The front end has been designed to receive the following systems:

- PAL B/G with FM stereo
 - PAL 1 or PAL BG with NICAM stereo
 - PAL BG with NICAM and FM stereo
 - PAL BG/I SECAM L/L' with NICAM and FM stereo
 - PAL BG SECAM DK with NICAM and FM stereo
- | | |
|------------------------|------------------------------------|
| • PAL B/G | = /01, /02/16 |
| • PAL I | = /05 Pal I with UHF reception |
| • PAL I Ireland | = /07 Pal I with VHF/UHF reception |
| • SECAM L,L', PAL BG/I | = /39 |
| • PAL B/G, SECAM DK | = /58 |

The relevant layout is given in the version list on the circuit diagram.

9.5.3 Tuner modulator (TUMOD)

The tuner and modulator are fitted into the same housing. Both the tuner and the modulator are PLL-controlled. The reception frequency or modulator frequency is set using the IIC bus.

The amplification is determined by the AGC voltage at pin 5 [1701] (for operation, see IF demodulator section).

9.5.4 IF selection

The IF frequency of the video carrier is 38.9 MHz for all systems except SECAM L' (33.9 MHz).

For PAL BG-SECAM DK and for PAL BG/I-SECAM L/L' a quasi-split audio system is used; i.e. for video and audio carriers, separate surface-wave filters (OFW) are required [1704, 1703]. For all other standards an intercarrier system is used; i.e. a common OFW with audio stair-step can be used [1704] for video and audio carriers.

For the PAL BG/I-SECAM L/L' version, an additional circuit for suppressing the adjacent channel audio carrier is provided, which is set using coil [5704] to maximum suppression at 40.4MHz.

9.5.5 IF demodulator

TDA 9818

The IF signal from the tuner is processed by another demodulator IC of type TDA 9818 [7705]. The TDA 9818 is used to demodulate pos. or neg. modulated video carriers. It is possible to generate a QSS-audio-IF signal or an intercarrier IF signal for demodulation in the audio demodulator [7761]. For the best possible video signal performance the IF signal is conveyed via an OFW [1704] according to the standard. The audio-IF carrier is selected in the audio OFW [1703] which is switched for SECAM L'. The output signal for this OFW is further processed in the TDA 9818. FM carriers are converted from the IF level into the audio IF position and further processed in the audio demodulator. The AFC coil [5702] on the TDA 9818 is adjusted so that when a frequency of 38.9 MHz is supplied to

the IF output of the tuner, the AFC voltage on pin 17 on the TDA 9818 is 2.5V. The setting of the picture carrier frequency for SECAM L in the TDA 9818 is achieved by connecting pin 7 of the IC via a potentiometer [3730] to earth. The AFC voltage on pin 17 TDA 9818 should then also be 2.5V at 33.9 MHz. The HF-AGC is set using the AGC controller [3707] so that with a sufficiently large input signal (74 dBV), the voltage at the IF output on the tuner [1701, pin 17] is 550 mVpp. The setting must be carried out when the audio carrier is switched off. The demodulated video signal appears on pin 16 [7705]. The video drop [1705] reduces adjacent channel sound carrier and sound carrier remainders in the video.

TDA 9817

As for TDA9818, without the option for processing AM audio and positive video modulation (SECAM L, L').

9.5.6 Audio demodulator

Multi-standard audio processor MSP 3415D

The MSP 3415D [7761] is a multi-standard sound processor which can demodulate FM Mono/Stereo, NICAM and AM signals. The incoming signal is first controlled and then digitised. The digital signal is then demodulated in 2 separate channels. In the first MSP channel, FM and NICAM (B/G/I/D/K) are demodulated, whereas in the second MSP channel, FM and AM is demodulated again (NICAM L corresponds to NICAM B/G). These demodulated signals are selected digitally in the I/O and switched to the D/A converter on the outputs. Amplitude and bandwidth of the demodulated audio signals can be determined in the MSP using the corresponding commands via the I²C bus. This means that the setting required for the best possible performance can be made.

FM stereo audio decoder TDA 9873

The TDA 9873 [7760] is a multi-standard A2 audio processor which can demodulate FM mono/stereo signals. The audio IF SIF2 is passed from pin 3 [7705] to pin 25 [7760]. The demodulated stereo signals AFL and AFR I²C bus are available controlled on pins 1 and 2.

9.6 Video signal processing VS (VS part)

9.6.1 Switchover functions in the signal electronics IC LA71595M [7004]:

The signal electronics IC LA71595M [7004] are controlled via the I²C Bus on pins 23 and 24 by the AIO.

As groups 5 and 6 can only be transferred with a change in HP1, it must be ensured that during measurements the HP1 line is always connected to the SE IC or replaced by a corresponding signal.

REC/PB via IIC bus

During RECORD pin 30 must be passed via [7009] on 5V (IREV=LOW) to activate the video write current stages. To keep the transient condition of the write current as short as possible, the signal electronics IC is set to REC via IIC bus before the pin 30 change.

PAL/SECAM/MESECAM/NTSC via IIC bus

SP/LP/SLP via IIC bus

VIDEO INPUT SELECTOR SWITCH via IIC bus

In 1-scart units a distinction is made via the IIC bus between VFV (pin 36 / VID2) and VBS which corresponds to VIN1 (pin 38 / VID1). In 2-scart units the video input selection is made via IIC bus in the STV6401 [7904] and the SE IC is always on VBS (pin 38 / VIN1).

VIDEO ENTRY

The feature frame pulse FFP signal on pin 26 is used to enter the artificial picture pulse for playback features and the test picture for the unit installation procedure:

Loop through	< 0.8V
Test picture	= 1.2 ... 3.8V
Artificial picture pulse	> 4.2V

LP/SP head pair switchover

The switchover between the long play LP head pair and the standard play SP head pair is made via the HSC signal (pin 25).

4/x scanner in play back:SP head pair:	1.2V <= HSC <= 2.8V
LP head pair:	0V <= HSC <= 0.8V
2/x scanner in play back:always	3.2V <= HSC <= 5V

Head switchover

The video head switchover is made using the HP1 signal (pin 11). To keep audio linear interference as low as possible, the HP1 polarity should be selected to be inverse and the HP1 level should be the same as the CROT signal on pin 10.

PB: SP1 / LP1:	1.2V <= HP1 <= 2.8V
SP2 / LP2:	0V <= HP1 <= 0.8V

Envelope curve comparator

If the ENVC signal (pin 94) is HIGH, the FM envelope curve on the LP head is greater than that on the SP head, and vice versa.

9.6.2 Recording

Luminance

The input signal (1-scart: pin 38 = scart, pin 36 = front end; 2-scart: pin 38 = input video selected using STV6401) is connected in the IC [7004] and is available uncontrolled on pin 32 as VREC (SECAM; VPS only unit data slicers). It reaches pin 31 via an electrolytic capacitor [2036]. In the IC [7004] the video signal first goes through an amplification control process (time constants determined by C [2035]). After the AGC the video signal reaches the FBC clamping stage (feed back clamp), then the video signal is divided onto 3 paths:

- **Loop-through signal path:** The video signal is amplified by 6dB following video entry and is available controlled on pin 29 as a VSB signal (OSD entry, data slicer -> I/O, front end,...).
- **Y-REC path:** The video signal passes via a 3.5 MHz low pass filter to vertical emphasis comprising the YNR block (part of this circuit block is used in REC for vertical emphasis) and a 1H-CCD delay line integrated into the SE IC [7004-C] and an external emitter follower [7006]. This vertical emphasis can be switched via IIC and is only active in LP. The Y-signal before the 1H-CCD can be measured on pins 43 and 45 on the IC [7004-C] (separated only by a coupling electrolytic capacitor). The Y-signal after the 1H-CCD is passed back from pin 46 IC [7004-C] via the E-follower [7006] on pin 41 IC [7004]. After the vertical emphasis the Y-signal passes via pin 21 [7004], the E-follower [7008] (the filter, on the base of the emitter follower is not active in REC mode (due to the low resistance of the output stage on pin 21 [7004]), via pin 21 [7004] and a clamping stage to the detail enhancer. The Y-signal is then passed to the non-linear emphasis, the linear emphasis (time constant via pin 18, 19 - due to the low resistance of the pin 18 output stage and the transistor [7010] introduced for impedance decoupling, the FM PB all-pass does not influence the linear emphasis) and the white/dark clipping stage. The signal generated in this way then triggers the FM modulator directly. The FM-Y-signal generated in this way is passed via the REC-EQ filter and the REC-FM-AGC1 to the Y-C

addition point. The FM-Y-signal can be measured after the REC-EQ filter on pin 12 [7004].

- **C-REC path:** see Chrominance PAL Recording (6.2.2).

Chrominance PAL

The chroma signal is separated from the video signal after the FBC clamping stage (see "Luminance recording") by the BPF1 band pass filter and reaches the ACC stage via a delay element (D.E.) and a low pass filter (LPF). The ACC amplifier stage controls the chroma amplitude for the subsequent stages (time constant via capacitor [2038] on pin 14 [7004]). The chroma signal is then conveyed to the main converter (Main Conv.). The main converter mixes the 5.06 MHz subcarrier with the 4.43 MHz chroma signal to the 627 kHz chroma FM signal. The subcarrier is a mixture of 4.43 MHz (the REC APC time constant on pin 65 compares quartz and burst frequency) and $(40 + 1/8) f_H = 627 \text{ kHz}$ (produced by $321 f_H$ -VCO corresponds to $8(40 + 1/8) f_H$, time constant pin 60/62 and phase rotation in accordance with the VHS standard, 10 [7004] (CROT)). Via a low pass filter (C_LPF) and the colour killer stage (KIL), the converted chroma signal reaches pin 72 on the IC [7004], where it is added directly to the Y FM signal IC internally via a capacitor [2007]. The colour killer can either identify the incoming signal itself (PAL yes/no, PAL: chroma signal out, SECAM L: chroma signal killed) or be set via the I²C bus to PAL MESECAM or SECAM L. The quartz oscillation (pin 66) is used for chroma processing, in addition to the reference frequency, and also for generating the pulse frequency for the combined CCD on pin 49 integrated into the IC [7004].

MESECAM

The signal path is virtually identical to the path for PAL.

The differences are:

- No phase rotation.
- The filter characteristic for the chroma band passes becomes wider.
- Free-running quartz frequency

SECAM L

The video signal (VREC) from the SE IC pin 32 [7004] passes through SECAM L SE IC pin 15 [7072] and a band pass filter (4.3 MHz BPF-A) and reaches the cloche filter (CA filter components pin 21) which reverses the Hf pre-emphasis on the sender side. The C-signal is then limited (LIM, time constant pin 18) and divided to 1/4 of the frequency in the frequency divider. The C-signal is suppressed in SYNC GATE during the H-sync. period. The harmonics arising in the division into four and the gating are suppressed in the band pass filter (1.1 MHz BPF) and then pre-processed in the anti-cloche filter (filter components pin 8) for standard VHS recording. The amplitude on the REC-chroma signal on pin 11 [7072] can be set using the setting resistor [3088] on pin 10 [7072]. This REC-chroma signal is passed via transistor [7077] as a CSRP signal to SE IC pin 72 [7004] following an external drop (3.9 MHz, suppression of the 3rd harmonics of the low frequency REC-chroma) and added to the FM-Y-signal in the SE IC.

As the SECAM SE IC (LA7339A) has an automatic cloche and anti cloche comparison, only the REC-chroma signal level is required to be set.

FM signal

After the addition of the FM-Y-signal and the C-signal, this FM-signal is adjusted by the REC-FM-AGC2 controlled by the IIC bus to the preset amplitude (reference: pin 74 [7004] resistor [3009]). The head pair is selected using the HSC control line.

9.6.3 Playback

FM signal

The FM signal coming from the scanner is amplified by approx. 60 dB. Depending on the level of the HSC and HP1 line, the amplified FM signal is connected to pin 74 [7004]. The envelope curve signal for the head currently active (TRIV) is output on pin 93 [7004]. In addition, the envelope curves for the SP and the LP heads which read from the tape are compared and output as the ENVC signal. The FM signal (FMPV) on pin 74 [7004] is used internally for Y, SECAM, MESECAM and NTSC M/N playback and externally for SECAM playback.

Luminance

The FM playback signal is first adjusted in the AGC stage to a constant level and filtered in the FM processing (PB-EQ). The signal exits the IC [7004] on pin 18, passes via an E-follower [7010] with drop (1.07 MHz - only in SECAM units - to suppress additional chroma remainders externally) to a phase shifter [7003] and enters the IC once more on pin 17 [7004]. The FM-Y signal limited using the double limiter is demodulated (FM-DEM) and filtered using a low pass (SUB_LPF). The demodulated Y signal is also affected by the recording-side pre-emphasis. This now removes the linear de-emphasis at the base of the emitter follower [7008]. The filter circuit is effective, as pin 21 [7004] becomes an open collector output in playback mode, where the load impedance is determined by the de-emphasis circuit. The Y signal is then clamped after the E-follower on pin 20 [7004], filtered using a low pass, and carried by a vertical noise canceller or dropout compensator (Y.N.R.). To do this the Y-signal exits the IC [7004] (out: pin 43, in: pin 41) and delayed by 1 H in the internal CCD. The CCD-1H delay line is effective for the Y signal first as a comb filter (vertical noise suppression) and secondly as a line storage device for the dropout compensation. The subsequent switching stages are: The non-linear de-emphasis (NON_LIN DE_EMP), horizontal noise canceller (N.C.1 / N.C.2) and the picture control switching to the increase in edge steepness (PIC_CTL ANR; sharpness). The luminance signal is then added to the chroma signal (Y/C MIX) and output (pin 29 [7004]) as FBAS signal via a clamp (FBC), the video input (CHARA INSERT) and a 6 dB amplifier (6 dB_AMO).

Chroma PAL

This is first adjusted in the AGC stage to a constant level and filtered in the FM processing (PB-EQ). The signal exits the IC on pin 18 [7004], and passes via an E-follower [7010] with drop (1.07 MHz). On pin 17, the FMPV signal is carried from the head amplifier to the IC [7007] signal electronics. From the FM playback signal the 627 kHz chroma signal is filtered using the internal low pass (C_LPF). The ACC amplifier amplifies and controls the chroma amplitude. In the main converter (MAIN CONV), the chroma signal is mixed with 5.06 MHz back to the original 4.43 MHz. The 5.06 MHz are produced in playback from the free-running quartz oscillator and from the $(40 + 1/8) f_H = 627 \text{ kHz}$ frequency derived from the 321 fH-VCO. After the main converter the chroma signal is freed as far as possible from crosstalk from additional traces using a 2H comb filter (internal CCD connections: pin 57 -> 54; pin 59 -> 52 and pin 51 -> 61). The chroma signal is then filtered using a low pass (LPF), checked by the colour killer, filtered once again by a band pass, looped through pins 72 and 71 and then added to the Y signal.

Chroma MESECAM

The signal path is virtually identical to the path for PAL.

The differences are:

- No phase rotation.
- The comb filter is not active.

Chroma SECAM L

During playback the FM signal is passed from the band on pin 74 [7004] after the E-follower [7002] (FMPV) to pin 13 [7072], where the amplitude is adjusted in the AGC and passed via the same band pass (1.1MHz BPF) as for recording. The NF pre-emphasis for the recording is then reversed using a cloche filter (external filter components on pin 8; the same components as for recording). In the subsequent stages the frequency of the signal is doubled, filtered using a band pass (2.2MHz BPF) and doubled once again. Then follows another band pass (4.3MHz BPF-B), and then the limiter (LIM) already used for recording. The signal is then suppressed again during the H-sync. period and passed through a band pass filter (4.3MHz BPF-A; also used for recording). Before the SECAM-chroma signal exits the IC on pin 17 [7072], an Hf pre-emphasis is carried out once more (anti-cloche; external filter components on pin 21; the same components as for recording). After pin 17 there is a drop at 2.4MHz which suppresses the 2nd harmonic of the chroma from the band, a low pass filter which improves the harmonics of the high frequency chroma and a transistor [7073] which has an emitter connected to pin 72 (CSRP) on the SE IC [7004].

NTSC

During the playback of NTSC signals, the original NTSC chroma is converted into a PAL chroma signal. This requires an internal switchover in the IC in the chroma part:

The internal CCD is switched over on a 1H comb filter to reduce crosstalk.

The NAP switchover is activated and translates the 4.43MHz NTSC chroma signal into a PAL signal.

Line and picture frequencies remain unchanged in accordance with the NTSC standard.

The result is a 60Hz NTSC Y-signal with a 4.43MHz PAL C-signal.

PAL M,N

As for chroma PAL (6.3.3).

9.6.4 General**SECAM:**

Automatic cloche and anti-cloche comparison: During the vertical blanking gap the external filter components (pin 21 or pin 8) on the cloche or anti-cloche are used to create an oscillator and to divide the resonance frequency produced, and compared with a frequency derived from the 4.43MHz oscillation (reference signal from the SE IC [7004]). Depending on the deviation, more or less internal capacity is connected in parallel to the external cloche and anti-cloche filter components. This process is carried out during each vertical blanking gap and thus also improves the temperature stability.

Chroma selection for REC and PB pin 71 and 72 SE IC [7004]:

Both the PB chroma and the REC chroma in PAL (MESECAM, PAL M/N) and also in SECAM are passed into the SE IC [7004] via pin 71 [7004]. In all PAL and MESECAM modes the DC voltage is on the base of the output emitter follower pin 72 [7004] 3.2V and the both bases of transistors [7077] and [7073] of the SECAM chroma signals are at 0V - > the PAL/MESECAM chroma signal is added to the FM-Y signal or to the PB-Y signal, according to REC or PB. In SECAM PB mode only the transistor [7073] has 2.5V DC voltage on the base. In SECAM REC mode only the transistor [7075] has 2.5V DC voltage on the base.

9.7 Audio linear (AL part)**9.7.1 Audio I/O for the 1-scart version**

The input is selected via the IIC bus control in the IC signal electronics [7004-A]. Either signal AIN1 (pin 76) or AFV (pin 80) is selected. The output signal AMLP (pin 96) is passed to scart 1 and to the HF modulator.

9.7.2 Audio I/O for the 2-scart version

The input is selected via the IIC bus control in the IC signal electronics [7004-A]. Either signal AIN1 (pin 76), AIN_F_AIN2 (pin 78) or AFV (pin 80) is selected. The output signal AMLP (pin 96) is always passed to the HF modulator.

9.7.3 Audio linear recording

The signal inputs for recording or loop-through are pins 76, 78 and 80 on the linear audio part of the IC LA71595 [7004-A]. During record and loop-through, the selected signal passes through the linear amplifier and then a mute stage and exits the IC on pin 96. This is the output which leads to the I/O part or the stereo units back to the AF part. The attenuation chain on pin 96 sets the required level for the ALC (Automatic Level Control) detector and the level for the recording amplifier. The time constant for the ALC detector is specified using R3605 and C2602 on pin 77. R3634, R3640, C2626 and C2627 create the frequency response for the recording amplifier. The output for the recording amplifier is pin 7. The recording current is then added to the bias current via resistor R3642 and flows via the audio head to pin 4 where an electronic switch is closed in the IC.

In long play mode the frequency characteristic is modified to the RC network R3635, R3641, C2630, C2631 for the recording amplifier.

The coil L5600 and the transistor T7608 create the erasing oscillator for the main eraser head and audio track eraser head, and generate the bias current for the audio head. The bias current is set using potentiometer 3625.

To prevent spikes, the erasing oscillator is switched on slowly. This is created using the switching stage T7603, C2609, R3611 and R3613.

9.7.4 Audio linear playback

During playback the switch [T7604, T7607] is controlled by pin 99 and is closed. The playback signal from the head is amplified in the equaliser stage (time constant between pin 1 and pin 3) and passed to pin 1. The resistor R3633 and the capacitor C2619 determine the head resonance during playback.

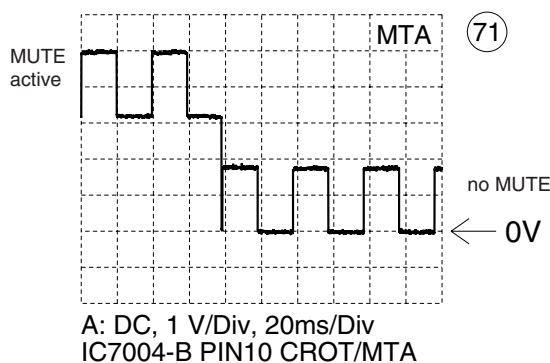
In long play mode the frequency characteristic is modified using R3627, C2617 for playback.

The output of the playback amplifier (pin 1) is passed via the filter R3632, C2623 to pin 100 where an electronic potentiometer sets the playback level via the 12C bus.

Amplifier and head tolerances are compensated here. The amplification can be compensated via software control (12C bus) in service mode.

9.7.5 Audio linear muting

The mute stage in the linear audio part on the IC LA71595 [7004-A] is controlled by the combination control line MTA_CROT which is connected on pin 10 (VS part). The mute stage is activated in that the CROT control signal (square-wave pulse 1.7 Vss) is moved into the upper direct voltage range ($> 2.2 \text{ V}$).



9.8 Audio HiFi - for stereo units (AF part)

9.8.1 General

All audio input and output selection switches, and the hi-fi FM audio signal processing, are located in the TDA9605 [7650]. This IC is controlled solely by the IIC bus. The carrier frequencies and band pass filter for the FM audio part are adjusted by the TDA9605 independently. This adjustment is started via the IIC bus following a mains reset. The RMHI signal is used as a reference for this [7650 Pin 41].

9.8.2 Audio I/O

The input and output selection switches are controlled exclusively by the IIC bus. Audio signals coming from the receiver part, the two scart sockets and the front sockets pass via pins 2 to 9 to the two input selector switches which select the relevant signals for the FM and the linear audio part. The output selector switch for SCART 1 and SCART 2 (pins 16, 17 and 19, 20) select the relevant signal sources, independently from one another.

The RFAGC limits the maximum amplitude of the signal to the AMCO modulator (pin 13) to prevent overmodulation.

9.8.3 Audio HiFi recording

The signal coming from the input selector switch (INPUT SEL) reaches, via a level actuator (VOLUME L/R) and a low pass filter (LPF), the NOISE REDUCTION block, which compresses the dynamics during recording. The compressed signal is passed to both FM modulators (1.4 MHz and 1.8 MHz carrier frequencies). Both carriers are added and pass to the FM audio head amplifier. Via the recording / playback switch on the head amplifier, which is switched using the control line RMHI, the FM signal reaches the output (pin 35, pin 36, pin 37) on the FM audio processor and then the audio heads via the rotating transformer. The TRIA_ALM line forwards the size of both audio signals (1 VRMS = 2.68 VDC) to the AIO processor [7899-B]. This DC level information is required during recording by the SCART or front cinch socket to prevent overmodulation of the FM carriers. When the audio signal levels are too high, they are attenuated using the VOLUME controller via the I²C bus.

9.8.4 Audio HiFi playback

The FM signal from the audio heads goes via the rotating transformer to the recording / playback switch (pin 35, pin 36, pin 37) on the head amplifier. After amplification in the head amplifier (66 dB), the FM signal reaches the HF-AGC (Automatic Gain Control), where the tolerances of the tape, the heads and the rotating transformer are balanced. Via the two band pass filter and limiters, the FM signals reach the PLL demodulators. Head change-over interference is suppressed using SAMPLE & HOLD stages (triggered by the RMHI signal). The demodulated signals are then expanded into the NOISE REDUCTION stage. The hi-fi signals are then available at the output selection switches. If there is no audio FM on the tape during playback, the output selector switch is switched over automatically from the IC to linear audio (input pin 22). In playback mode the TRIA_ALM line supplies the level of the FM envelope curve to the AIO processor [IC7899-B]. This level information from the FM envelope curve is used for the hi-fi tracking of the rotating FM audio heads to achieve the best possible playback quality (typically: 3.5 VDC).

9.8.5 Interface to the audio linear

In recording mode, the input selection switch NORMAL SEL in the TDA9605 [7650] selects the audio source for the linear audio part in the signal electronics IC LA71595 [7004 - A] and passes this signal to pin 21 (AMLR).

In stereo sets, the input selection switch on the signal electronics IC LA71595 [7004-A] is always set to IN2 (pin 78). During playback the AMLP signal passes from the linear audio part in the signal electronics IC [7004-A] pin 96 to the linear audio input on pin 22 on the TDA9605 [7650].

9.9 IN/OUT (IO part)

9.9.1 Video

The entire video-I/O is carried out in 2-scart units using the matrix switch STV6401 [7904], which is controlled by the AIO via the IIC bus (SDA, SCL). To do this, the following signals are connected to STV6401 at the inputs: VFV-pin4, VIN1-pin6, VIN2-pin8, VOUT¹⁾-pin10 (¹⁾The VOUT signal is also passed through a voltage divider and a low pass [2906, 3934, 3928] and passed to the modulator where necessary via the emitter follower [7909]) and VFR-pin12 (front cinch input). The outputs OUT3/pin15 (scart 2) and OUT2/pin16 (scart 1) in the IC are fitted with a 6dB amplifier and convey the signal to the relevant scart socket. OUT1/pin2 has no amplifier; this signal (VBS) is passed on to the VS circuit parts for further processing:

In 1-scart units the SE IC [7004] selects the input video. SE IC original layout: VIN1 (the VBS line is used in the plan) pin 38, VFV pin 36. The VOUT1 signal (scart 1 video out) is generated using an E-follower [7908] from the VOUT signal.

Audio for the 2-scart version:

The output signal for scart 1 is selected using the switch - IC HEF4053 [7911-C] using the MON control line (pin 9) from AMLP (pin 5) and AINF_AIN2 (pin 3). The output signal for scart 2 is selected using the switch - IC HEF4053 [7911-B] using the DEC control line (pin 10) from AIN1 (pin 2) and AFV (pin 1).

9.9.2 Decoder mode: (REC or STOP)

Program position with decoder (front end)

The front end signal (VFV or AFV 1/2) is passed to the decoder connected to Scart 2 and from there, goes back to the VCR via VIN2 or AIN2L/AIN2R.

External input with decoder (9.2.2) is not possible for these program positions.

External input with decoder

The signal from scart 1-in (normally TV set) is passed to the decoder connected to scart 2. For scrambled programs, the decoder switches the pin 8 to high. The VCR then passes the decoded signal from scart 2-in to scart 1-out.

9.10 Follow Me (FOME part)

This circuit is used to compare the front end video with the video on scart 1 (video from the TV connected) in order to be able to save the stations in the same order as on the TV. The video signals from the front end (VFV) and from the scart socket (VIN1) are "digitised" using filters and comparators [7530-C, 7530-D] and compared with one another [7531, 7532, 7530-A]. Low on the output for the circuit means that the picture contents for the two video signals are identical and that both receiver parts (TV and VCR) therefore have to be adjusted for the same station. Possible errors detected may result with similar signals, e.g. news programmes.

9.11 VPS/PDC, on-screen display (VPO part)**9.11.1 VPS/PDC**

The VPS and PDC data is either decoded by the VPS-PDC decoder-IC SDA5650 [7502] or by the OSD-IC with integrated VPS, PDC decoder SDA5652 [7502]. Both ICs are compatible in terms of pins, despite any differences in the peripherals.

The VPS-PDC data are read from the vertical blanking gap and stored in the internal RAM. This data is read from the P via the I²C bus.

The time can also be read from the TXT header line (required for "Time download"). The date is not called up from the TXT header (various write versions of the preset stations) but only via PDC format-1.

In the case of the SDA5650 [7502] the input video signal comes from the signal electronics IC LA71595M [7004-B pin 32] (VREC) via a 470nF capacitor [2504] to the data slicer input on the SDA5650 (pin 17). For the SDA5652 the input signal from pin 29 (VSB) on the LA71595M [7004-B] comes via an emitter follower [7501] with a voltage divider to the data slicer input on the SDA5652 (pin 17).

9.11.2 OSD-PART

The IC SDA5652 [7502] also allows both the generation of text keyboard matrices into a video signal and the generation of an entire picture (full page) for menu-control or if no background video is available.

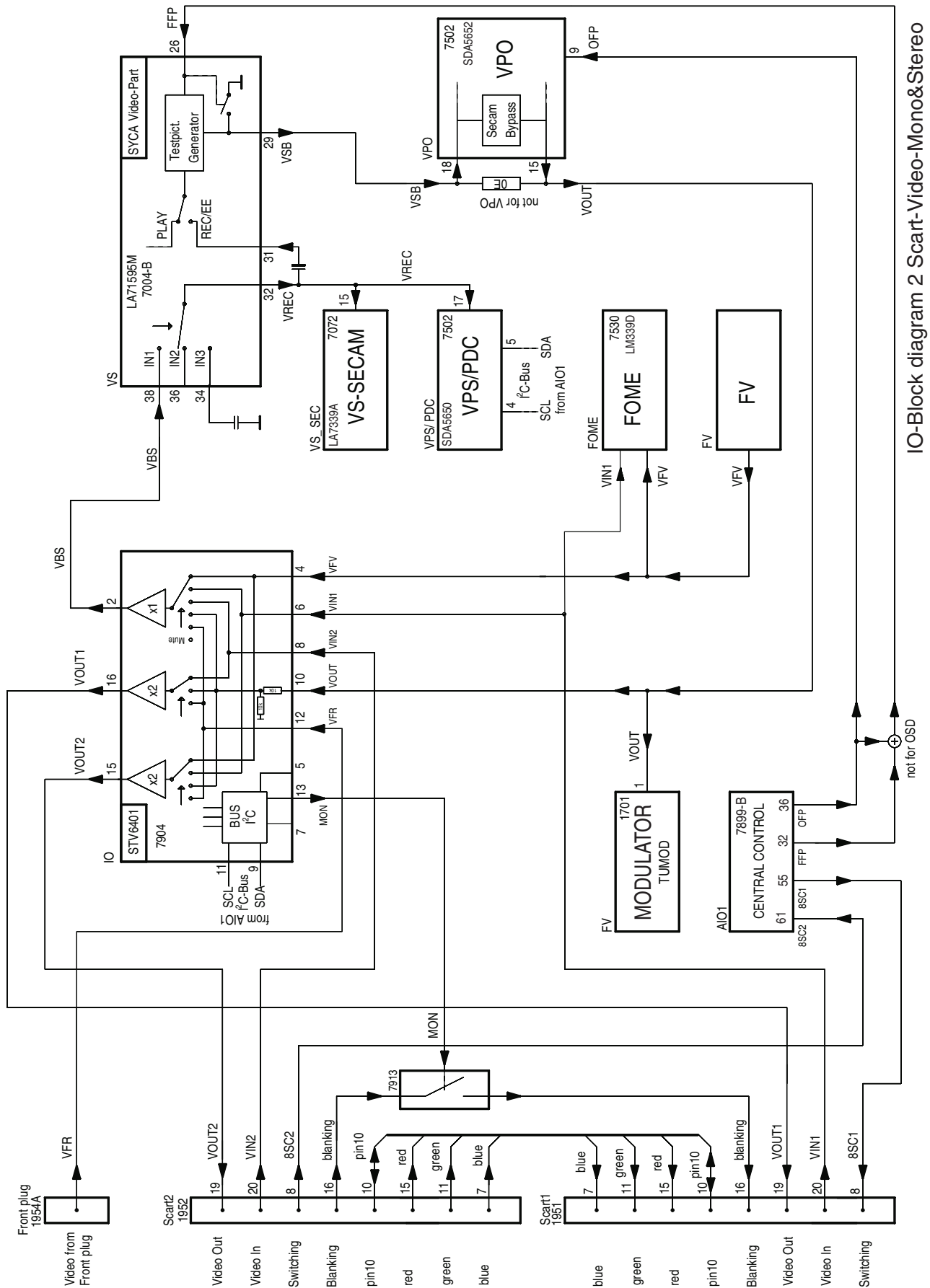
The video signal (VSB) passes from the signal electronics IC LA71595M [7004-B pin 29] via a resistor [3512] to the input for the OSD-IC [7502 pin 18]. For keyboard matrices in Secam video signals, a bypass between video-in and video-out is activated via a switch inside the IC and a band filter [2507, 5502]. The output signal is available on pin 15.

A multiple of the doubled colour subcarrier oscillation from the signal electronics (2FSC/8.86MHz) is used as the system pulse for the IC. It is also used as a reference for generating the various OSD colours. The signal reaches the IC via a coupling capacitor [2509].

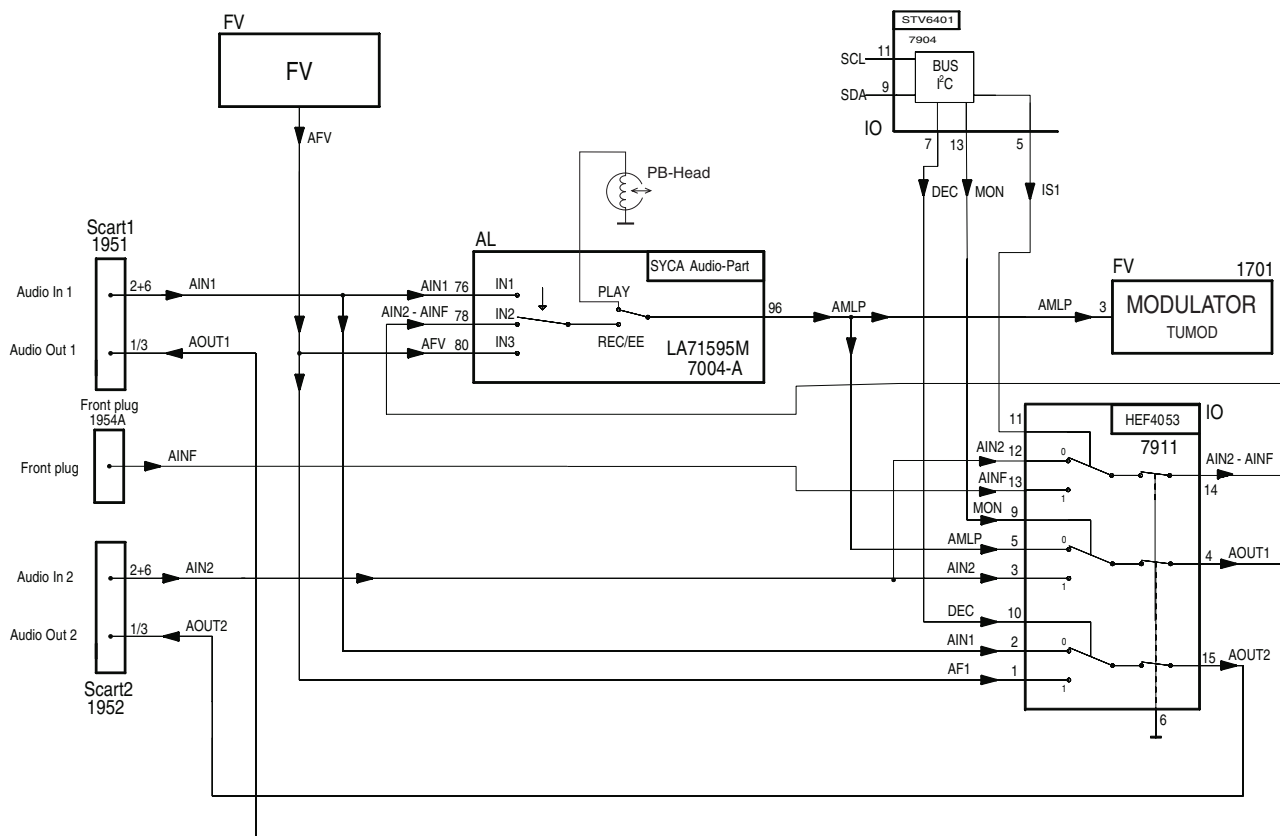
For the vertical synchronisation of keyboard matrices, an OSD frame pulse (OFP) is generated by the P [7899-B pin 36] and passed to the IC [7502] on pin 9. The horizontal sync-pulse is generated using an internal sync-separator and an internal H-PLL from the video signal on pin 17.

During full-page OSD (menu or no video) neither a vertical-sync (OFP) nor an H-sync is required, as in this mode, the OSD-IC generates everything from the system clock frequency, i.e. all the necessary pulses are generated internally from the 2FSC signal.

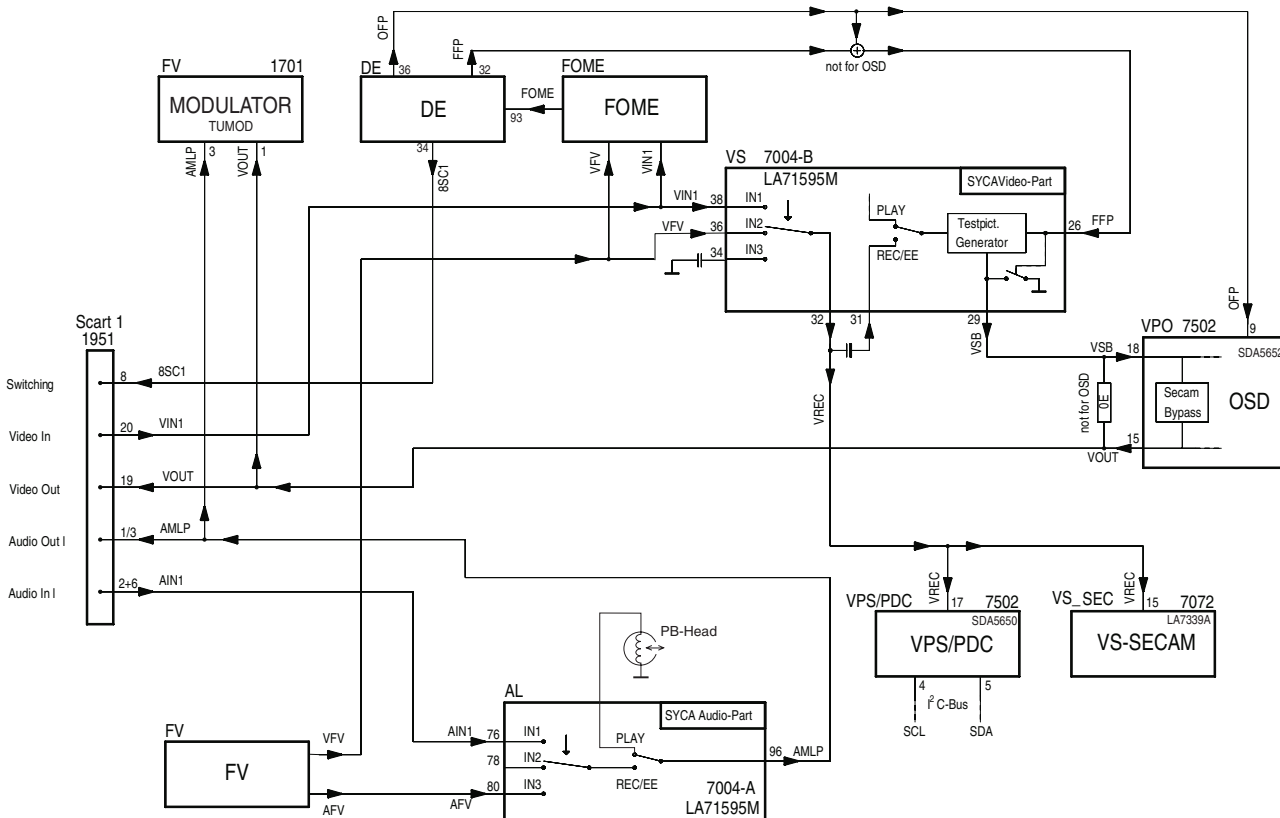
9.12 Simple Blockdiagram



IO-Block diagram 2 Scart-Video-Mono&Stereo

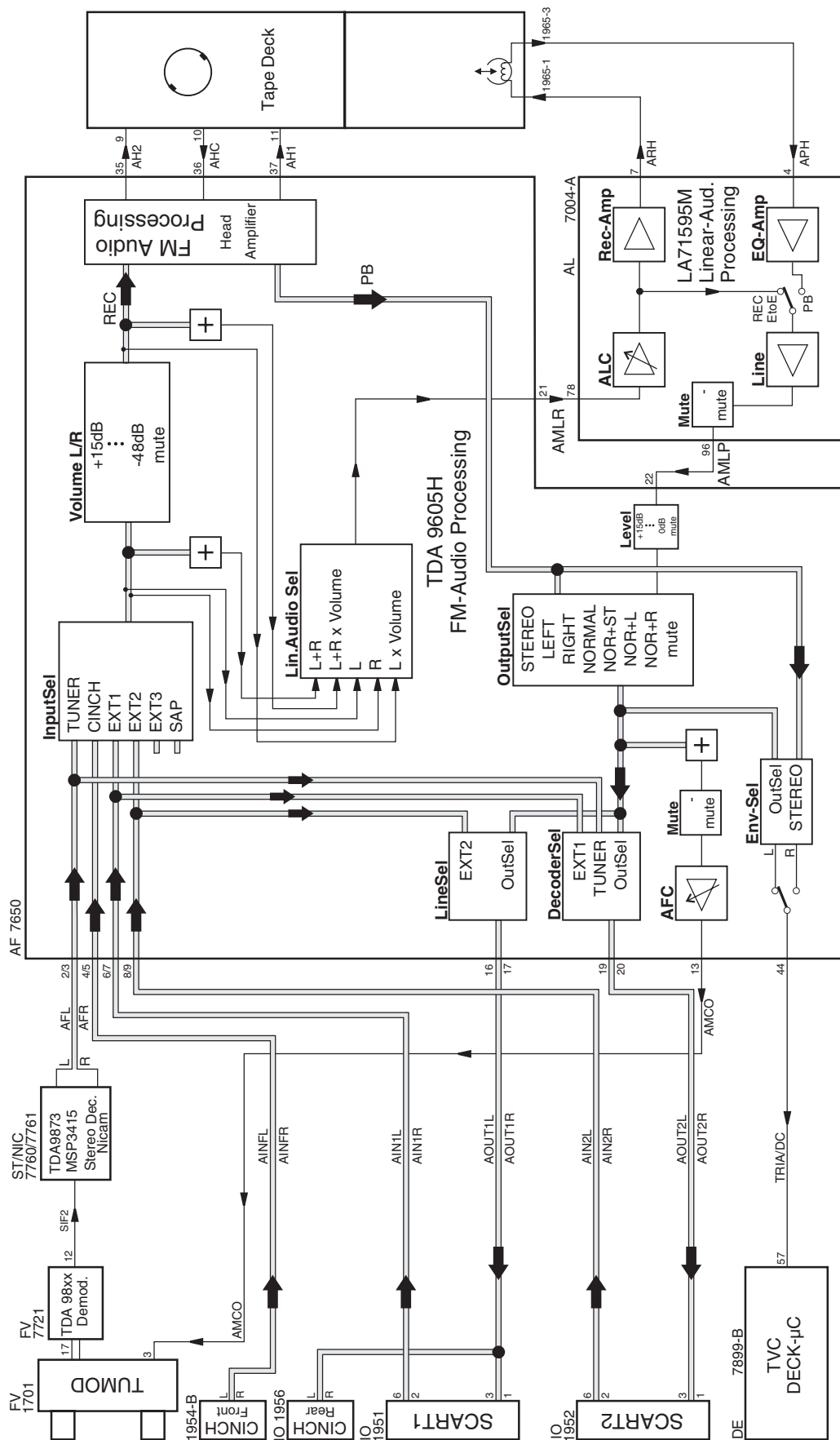


IO-Block diagram 2 Scart-Audio-Mono



QMB1 IO-Block diagram 1 Scart-Audio-Video-Mono

9.13 Simple Blockdiagram FM Audio / Linear Audio processing



9.14 List of abbreviations

[illegible]

Signal	Description	Application											
CSYNC	Composite sync pulse		AIO1							VS			
CTL1	CTL-Synch-1				DE		AL						
CTL2	CTL-Synch-2				DE		AL						
DEC	Audio switching voltage AIN1/AFV											IO	
DECK_INIT	Init switch		AIO1										
DRUM	Head motor speed phase signal		AIO1		DE								
ENVC	Envelope comparator signal		AIO1							VS			
FFP	Feature frame pulse		AIO1							VS			
FGD	Capstan tach pulse digital		AIO1		DE								
FMPV	FM video playback									VS			
FOME	Follow Me (video signals equal)		AIO1										FOME
FSC	Sub carrier frequency									VS			
FTA	Threading tach				DE								
FTAD	Threading tach digital		AIO1		DE								
GREEN	Green signal between scart1/2											IO	
GND	Ground	PS	AIO1		DE	AF						IO	
GNDAF	Ground on C650/651					AF							
GND AIO	Ground on C601					AF	AL					IO	
GNDAL	Ground on C603						AL						
GNDAL1	Ground on C602						AL						
GNDD	Ground digital	PS	AIO1	AIO2									
GNDDE	Ground digital deck		AIO1		DE								
GNDEO	Ground on C601						AL						
GNDFMS	Ground FM							FM					
GNDFOME	Ground FOME on C530												FOME
GNDFV	Ground FV-ZF							FM	FV			IO	
GNDKEY	Ground key			AIO2									
GNDLED	Ground led	PS	AIO1										
GNDM1	Ground capstan motor	PS			DE								
GNDS	Ground for DE-CTL ampl.				DE								
GNDVIO	Ground video IO								FV	VS	VPO	IO	FOME
GNDVPO	Ground VPO on C500/501										VPO		
GNDVS	Ground VS on C602/603					AF	AL			VS			
GNDVARI	Ground front cinch											IO	
HEHI	Heater for displaytube high	PS		AIO2									
HELO	Heater for displaytube low	PS		AIO2									
HP1	Head-Puls-1		AIO1							VS			
HSC	Head switch puls SP / LP		AIO1							VS			
I1WSTBY	Inverse < 1W switch	PS	AIO1										
ILED	LED-tower supply		AIO1										
IPOR	Inverse power on reset		AIO1	AIO2	DE								
IREV	Erase oscillator on/off		AIO1				AL			VS			
IRR	IR receiver pulse		AIO1	AIO2									
IS1	Audio switching voltage AIN1/AFV											IO	
KEY_IN	Key matrix voltage		AIO1	AIO2									
KEY_LED	Key led front shuttle		AIO1										
LH1	Longplay-Head-1									VS			
LH1'	Longplay-Head-1'									VS			
LH2	Longplay-Head-2									VS			
LH2'	Longplay-Head-2'									VS			
MON	Blanking loop through scart 1/2											IO	
MOT1	Scanner motor 1 phase				DE								
MOT2	Scanner motor 2 phase				DE								
MOT3	Scanner motor 3 phase				DE								

Signal	Description	Application											
MTA_CROT	Audio mute / Colour rotation on/off		AIO1				AL			VS			
OFP	Frame pulse		AIO1								VPO		
PBH	PB-switch									VS			
PG_FG	Head wheel position/-speed		AIO1		DE								
PGIN	Scanner-Motor-Pulse				DE								
PSS	PAL or secam-L		AIO1						FV				
RECP	Record protection		AIO1										
RED/C	Red signal between scart 1/2											IO	
RMHI	REC-Mute/HeadPuls-Audio		AIO1			AF							
SATCO	Satelite control signal		AIO1										
SB1	Secam band 1		AIO1						FV				
SCL	IIC bus clock		AIO1	AIO2	DE	AF		FM	FV	VS	VPO	IO	
SDA	IIC bus data		AIO1	AIO2	DE	AF		FM	FV	VS	VPO	IO	
SDA-VS	IIC bus data filtered to VS									VS			
SFS	Sound filter switch		AIO1						FV				
SH1	Standard play-Head-1									VS			
SH1'	Standard play-Head-1'									VS			
SH2	Standard play-Head-2									VS			
SH2'	Standard play-Head-2'									VS			
SIF2	Sound-interfrequency							FM	FV				
STBY	Stand by switch	PS	AIO1	AIO2	DE								
SYNC	Control track pulse		AIO1		DE								
TAE	Tape end detection		AIO1										
TAS	Tape start detection		AIO1										
THIO	Threading motor in/out		AIO1		DE								
TMO	Threading motor on/off		AIO1		DE								
TRIA-ALM	Tracking audio / audio level indication		AIO1			AF							
TRIV	Tracking information video		AIO1							VS			
VBS	Video input									VS		IO	
VFV	Video from frontend								FV	VS		IO	FOME
VIN1	Video input scart 1											IO	FOME
VISS	Control sync pulse inversion		AIO1		DE								
VMOD	Video to the modulator								FV			IO	
VOUT	Video from OSD part										VPO	IO	
VREC	Video record from I/O									VS	VPO		
VS	Video from signal electronics									VS	VPO		
W_R	Control track write/read		AIO1		DE								
WTL	Wind tachometer left				DE								
WTL	Wind tachometer left digital		AIO1		DE								
WTR	Wind tachometer right				DE								
WTRD	Wind tachometer right digital		AIO1		DE								

PS	Power Supply	page 56
AIO2	Display Control	page 57
AIO1	Central Control	page 58
DE	Deck Electronics	page 59
FV	Frontend	page 61
FM	Audio Stereo Nicam	page 62
AL	Audio Linear	page 64
AF	Audio FM Processing	page 65
VS	Video Signal Processing	page 67
VPO	OSD, VPS/PDC	page 68
IO	In/Out	page 69
FOME	Follow me	page 70

10. Tape deck

10.1 Drive assembly

This tape deck has three motors; one providing precision drive for the scanner unit; the second providing direct drive for the capstan and belt drive for the reel tables; the third motor drives the lift and tape threading/dethreading operations.

Special features are:

- Quick start
- Short winding time
- Automatic cleaning of video heads by cleaning roller

To obtain a high repair standard we have developed a range of service kit's. These kit's covers the spare parts which are engaged together.

The tape deck's sensors are located on the motherboard underneath the tape deck, and included in its circuitry, lay out and parts list.

10.1.1 Deck parts replacement

The procedure for the removal and refitting of the following parts is described; only the lift, the scanner, the capstan motor and the A/C head are fixed by screws.

All the other deck assembly parts are held only by snap hooks.

For the replacement of parts on the underside of the tape deck, remove the tape deck from the motherboard.

Manual extraction of cassette:

If, after the Eject button has been pressed, the drive does not unthread and eject the cassette, the dethreading/eject operation can also be carried out manually by turning the wheel at the rear of the threading motor.

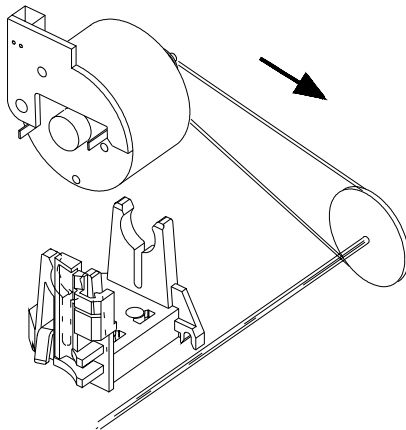
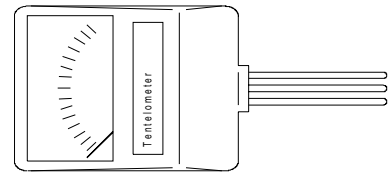


Figure 10-1

IMPORTANT:

After each repair has been carried out in the drive assembly, the first operation after repairing must be to bring the cassette compartment into „eject“ position by hand.

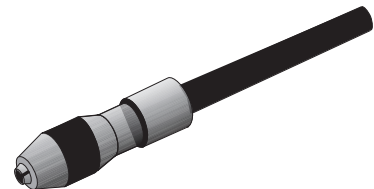
Auxiliary tools for deck adjustment:



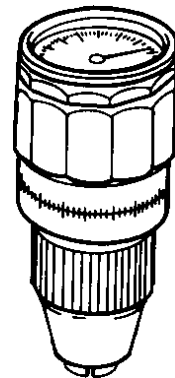
Tentelometer 4822 395 90584



Tool for tapetension adjustment 4822 395 50188



Handle 4822 256 90493



Torquemeter: 600 gf-cm 4822 395 90232
90 gf-cm 4822 395 80196



Post adjustment screwdriver 4822 395 50275

Testcassette 4822 397 30103

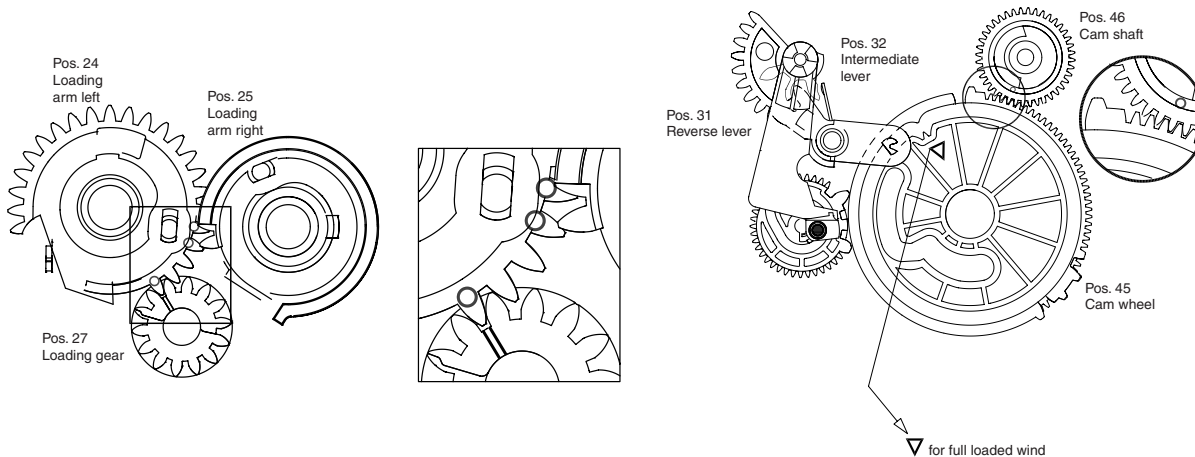
Nylon gloves 5322 395 94022

10.1.2 Deck layout diagram

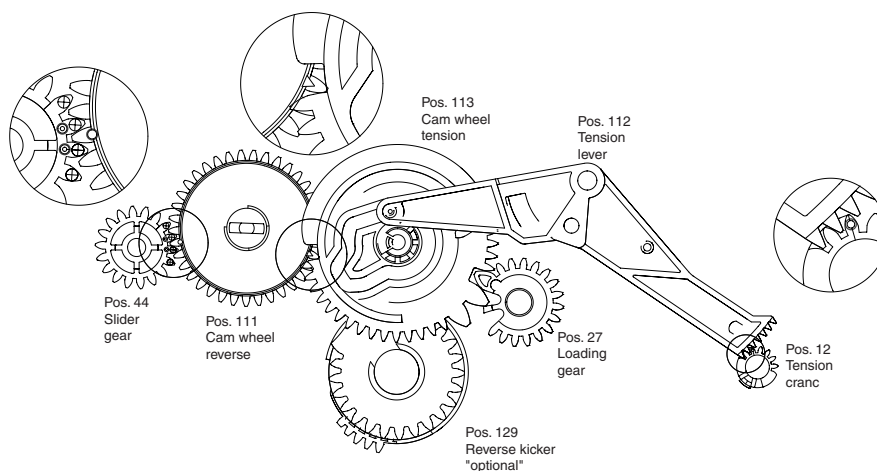
Deck in position „threaded out“.

The following diagrams indicate the relative position of the gearwheels and levers when the deck is in the threaded out (cassette-compartment down) position.

Top view



Underside view



10.1.3 The lift

Refitting the lift compartment:

Ensure the lift compartment is down and gear A is rotated one click stop anticlockwise from the down position. The removal and refitting of the lift can be carried out in all deck positions with the exception of „eject“ (ensure that gears 103/105 are free and if present the cassette loader gear 2 pos.105 is positioned to the rear).

To remove the lift:

Free the holding bracket (see figure 10-2) by rotating it up and back from the upper end. Unscrew the 4 screws on the underside of the deck. Carefully remove the lift vertically, noting the position of the record protect operating lever.

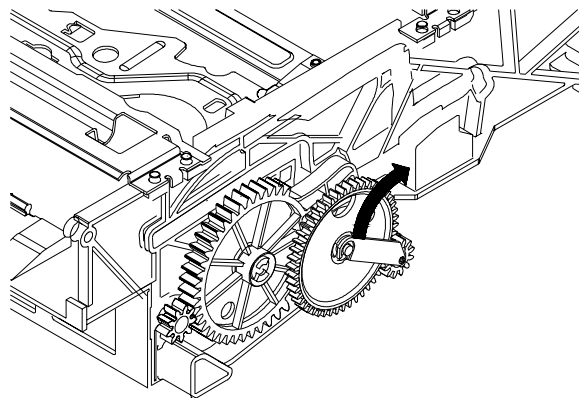


Figure 10-2

10.1.4 Scanner replacement

Removal:

Nylon gloves should be worn when handling the head disc.
Remove the deck from the set/mobo.

Unscrew the three scanner screws on the underside of the deck.

Pull out the scanner from the top. (see figure 10-3)

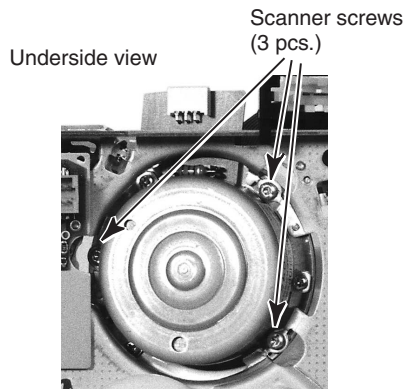


Figure 10-3

Installation:

Insert the scanner (with protective cover) carefully from top.
PCB and flex foil to the rear.

Be sure that the scanner is engaged to the reference pin located on the chassis.

Turn the tape deck, holding the scanner in the deck by hand and fix it by use of the three scanner screws.

Remove carefully the protective cover from top.

After replacing the scanner, carry out the following adjustments and checks:

Head switching puls.

Writing current adjustment.

Tape path alignment.

Check and adjust if necessary.

10.1.5 A/C Head (Combi head) (Pos. 36)

Remove the fixing spring (A) (see figure 10-4)

Remove the fixing screw and replace the A/C head.

Use a new fixing spring (included with new A/C head) for reassembly.

After the A/C head has been replaced, all adjustments described in paragraph "A/C Combi head" and paragraph 10.2.2 have to be carried out.

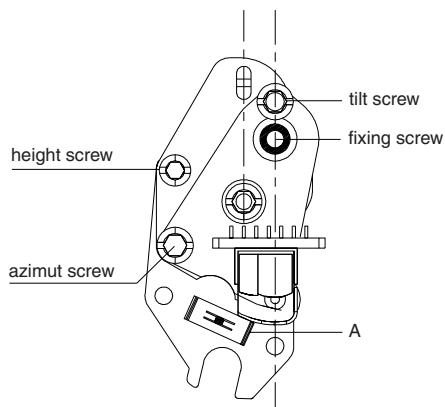


Figure 10-4

10.1.6 Threading motor (Pos. 38)

Remove the belt and disconnect the connector plug.
Remove the threading motor from the motor supports (see figure 10-5).

During reassembly ensure that the threading motor is correctly located in the front and rear supports.

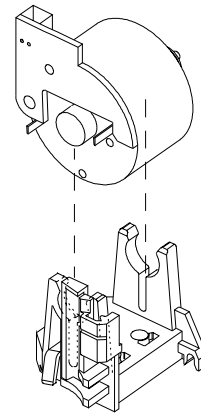


Figure 10-5

10.1.7 Capstan motor (Pos. 127)

Remove the tape deck.

Remove the belt (pos.126) on the underside;

Remove the three capstan motor fixing screws (see figure 10-6) and withdraw the capstan motor downward from the drive assembly.

The reassembly is carried out in reverse order. Make sure that the capstan is free of grease.

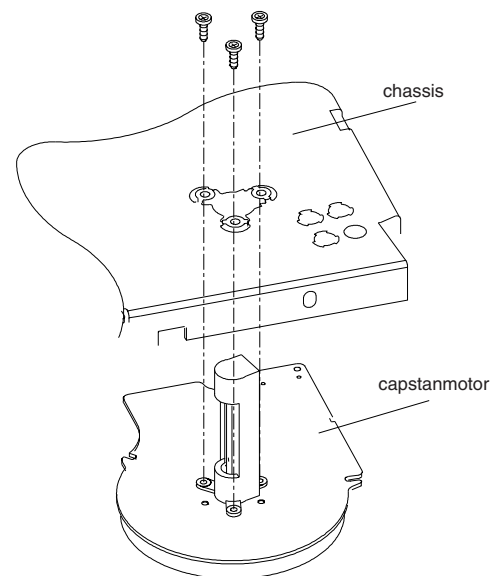


Figure 10-6

10.1.8 Pressure roller (Pos. 37)

Remove the tape deck

Unhook and remove the pressure roller tension spring. Release the pressure roller guide (pos. 41) from the guide in the threading motor holder by pressing the top of the motor guide rearwards and rotating the pressure roller guide assembly clockwise by approximately a quarter of a turn (see figure 10-7). The pressure roller and guide can now be lifted clear.

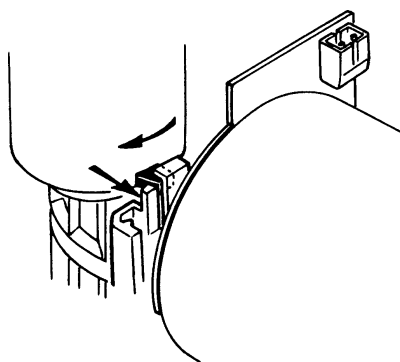
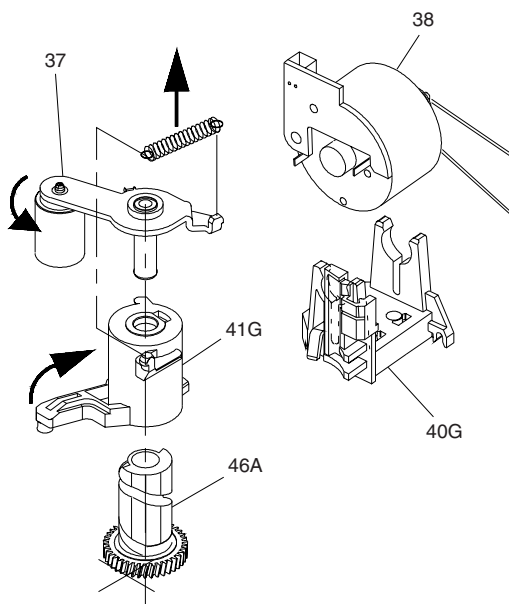


Figure 10-7

Ensure that no grease from the pressure roller guide gets to the capstan or pressure roller. The reassembly is carried out in reverse order.

10.1.9 Roller unit right (Pos. 26)

Remove the tape deck.

Compress the two snap hooks by means of a pair of tweezers and remove the roller assy from the roller unit right (see figure 10-8).

Unhinge the loading arm right from the holding plate and push the latter towards the front of the deck to remove from the guide (right).

NOTE:

During reassembly ensure the link from 25 is engaged in the hole of the holder plate 26.

After replacing the roller unit (right), the tape path has to be checked, and adjusted if necessary.

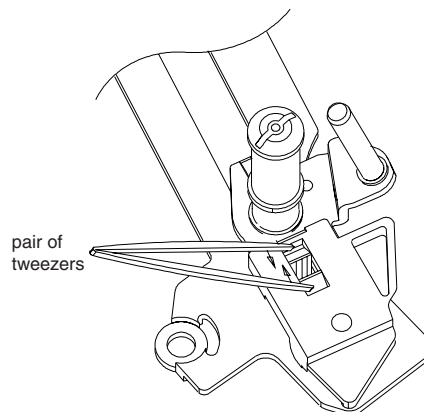


Figure 10-8

10.1.10 Roller unit left (Pos.23)

Set the drive assy to „Eject“ position.

Unhook the tension arm spring (pos. 11), to avoid the tension arm spring being pre-loaded.

At the bottom side of the drive assy remove the tension lever (pos.112).

Compress the two snap hooks by means of a pair of tweezers and remove the roller assy (A) from the plate (B).

Unhinge the loading arm (left) from the holding plate and remove the latter downward from the drive assy through the recess in the chassis (see figure 10-9).

The reassembly is carried out in reverse order.

NOTE :

During reassembly

1. Place the carriage holding plate in the assembly with the half-round cutout nearest the rear of the deck.
2. When the loading arm is refitted ensure the pin on the underside of 23 is through the link of 24B.

After replacing the roller unit (left) the tape path has to be checked (see division 10.2.1 Tape path), and adjusted if necessary.

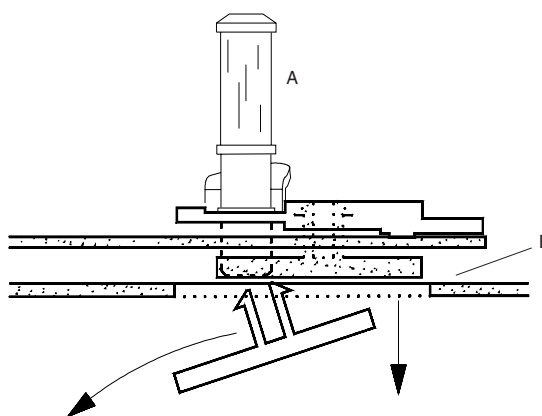


Figure 10-9

10.2 Adjustments

Adjustments must not be made in the service position.

10.2.1 Tape path

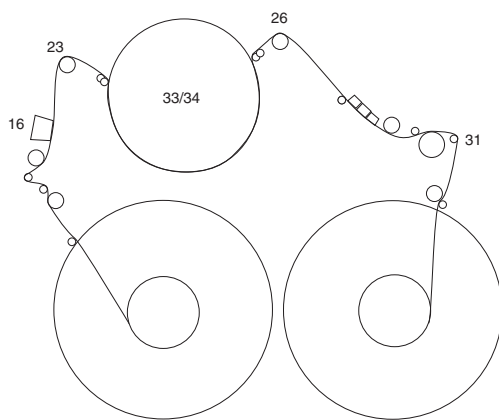


Figure 10-10

Roller left unit/roller unit right

Preparation:

Connect one input of a dual trace oscilloscope to observe the tape sync pulse CTL. The other input (DC coupled) to observe the tracking information TRIV.

Trigger the oscilloscope externally on the head pulse HP1 ("SWIN").

Playback the black and white section of the alignment test tape.

Set the deck in the condition where the video heads are running along the upper edge of the tracks only by:

- Call the service test program (see chapter 5.1 Service test program)
- Activate manual tracking (service test program step 03) and watch the tape sync pulse move to the left in relation to the TRIV signal.
- Note the extreme left hand position reached by the sync pulse, repeat as necessary.
- Stop the movement of the pulse when the TRIV signal reduces to 1/2 to 2/3 maximum amplitude by pressing the normal play button. A noisy picture (disturbances) is visible on the TV set and the CTL pulse should be to the left of the display.

The recorder will hold this position until the service test program step 03 is left.

This condition works only if X-distance is adjusted.

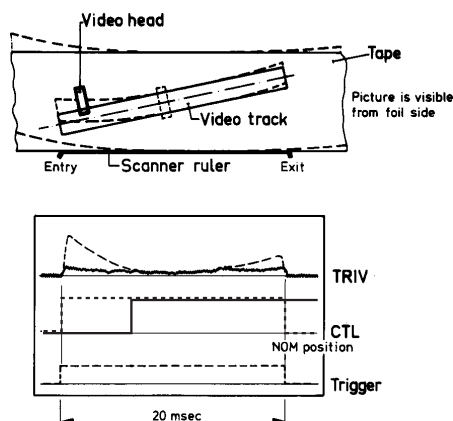


Figure 10-11

Adjustment:

Adjust the left and right roller units to make the tracking signal TRIV straight and flat as possible (Fig. 18).

A/C Combi head

Tilt angle adjustment

Set the drive to feature mode (e.g. +7)

Adjustment :

By means of the tilt angle adjusting screw move the tape until the lower edge just touches the tape guide A1 (see figure 10-12) the tape must not be distorted at the lower edge (by pressing onto guide).

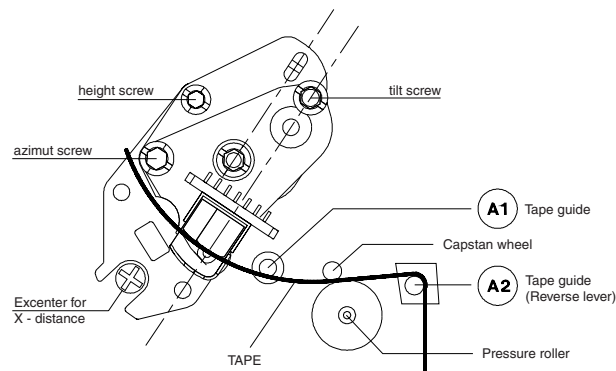


Figure 10-12

Adjustment of the azimuth angle and the head height:

Connect an oscilloscope to the linear Audio output.

Play the section of the test cassette with the audio signal 400 Hz.

Adjust for maximum output voltage by means of the height adjustment screw

Play the section of the test cassette with the audio signal 8 kHz.

Adjust to maximum output voltage by means of the azimuth adjustment screw (see figure 10-12).

If necessary, repeat this procedure

Check the tilt angle adjustment

If the tape path was completely out of adjustment or if several components in the tape path have been replaced, it is possible, that the adjustments described in paragraph "Roller left unit/roller unit right" and paragraph "A/C Combi head" have to be repeated several times.

10.2.2 Adjustment of the horizontal distance (x-distance)

Before this adjustment is carried out, insert the test cassette (start from Eject position). Call the service test program (tracking value will take up its nominal position) and press the „play“ button.

Playback the black/white part of the test cassette.)

Display the TRIV signal on an oscilloscope (DC-coupled) and adjust for maximum voltage by means of the excentric screw (see figure 10-12).

10.2.3 Brake band and tape tension

Due to further development it is no longer necessary to make these adjustments after replacement of the brake band.
If the brake band or tape tension are completely misadjusted, set them to a center position; set the drive to „play“ and adjust the brake band until the edge of the elbow of the tape tension arm is aligned with the left inner edge of the left guide (see figure 10-13).

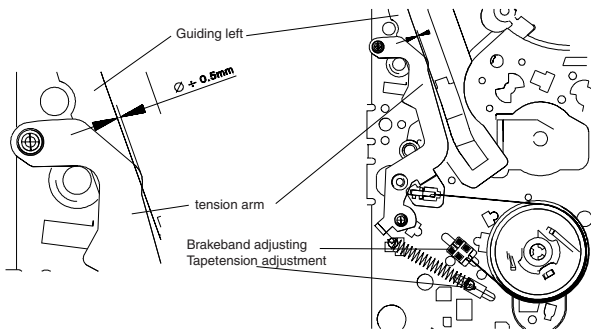


Figure 10-13

10.2.4 Friction clutch control check

Set the drive to „Play“ position.
Place the torquemeter on the right reel.
Turn the capstan motor to move the right reel clockwise.
Keep turning, until the indication at the torquemeter no longer changes (see figure 10-14).
The torque has to be 10,5 mNm \pm 25% (105gFcm \pm 25%)

10.2.5 Reverse brake control

Set the drive to „Reverse“ position.
Place a torquemeter on the right reel and turn the latter counterclockwise, until the reel just starts to flip.
The value indicated at the torquemeter has to be 7mNm \pm 3mNm (70 gFcm \pm 30gFcm) (see figure 10-14).

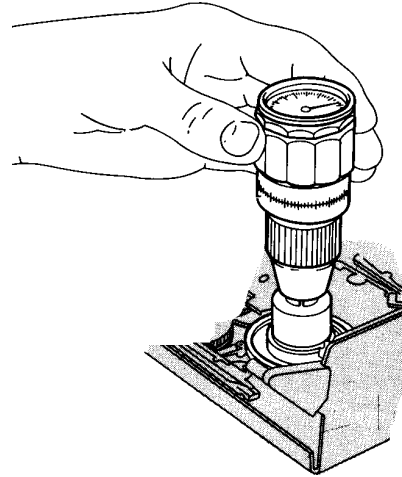
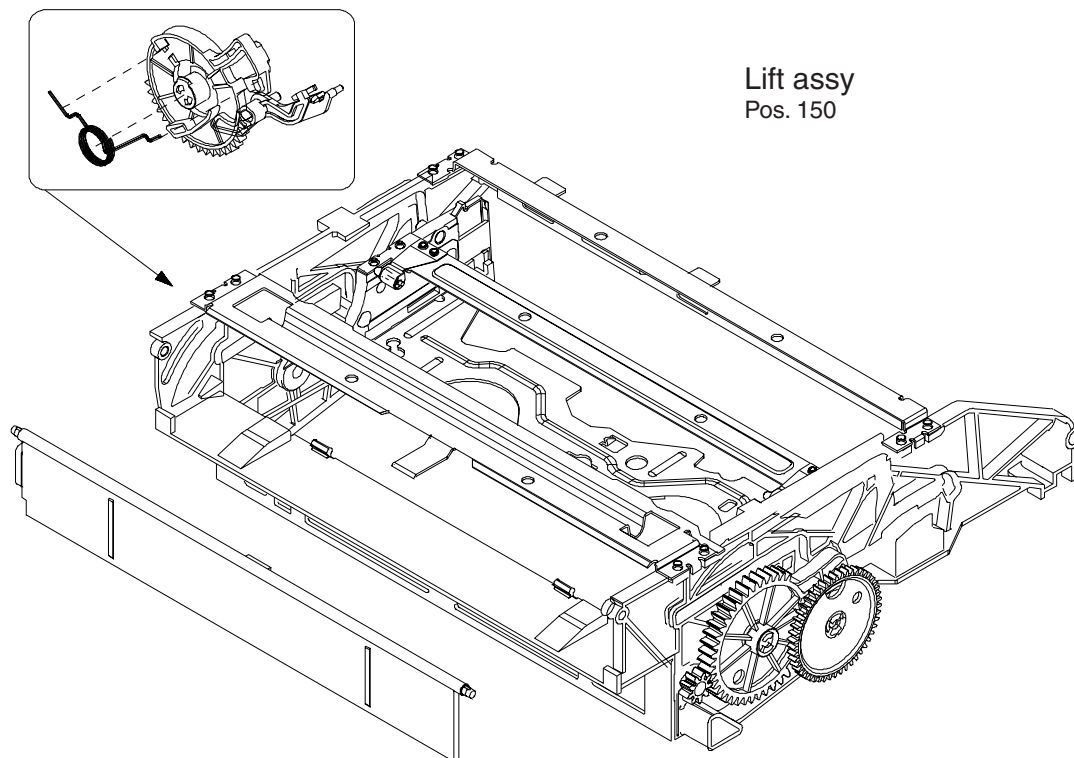
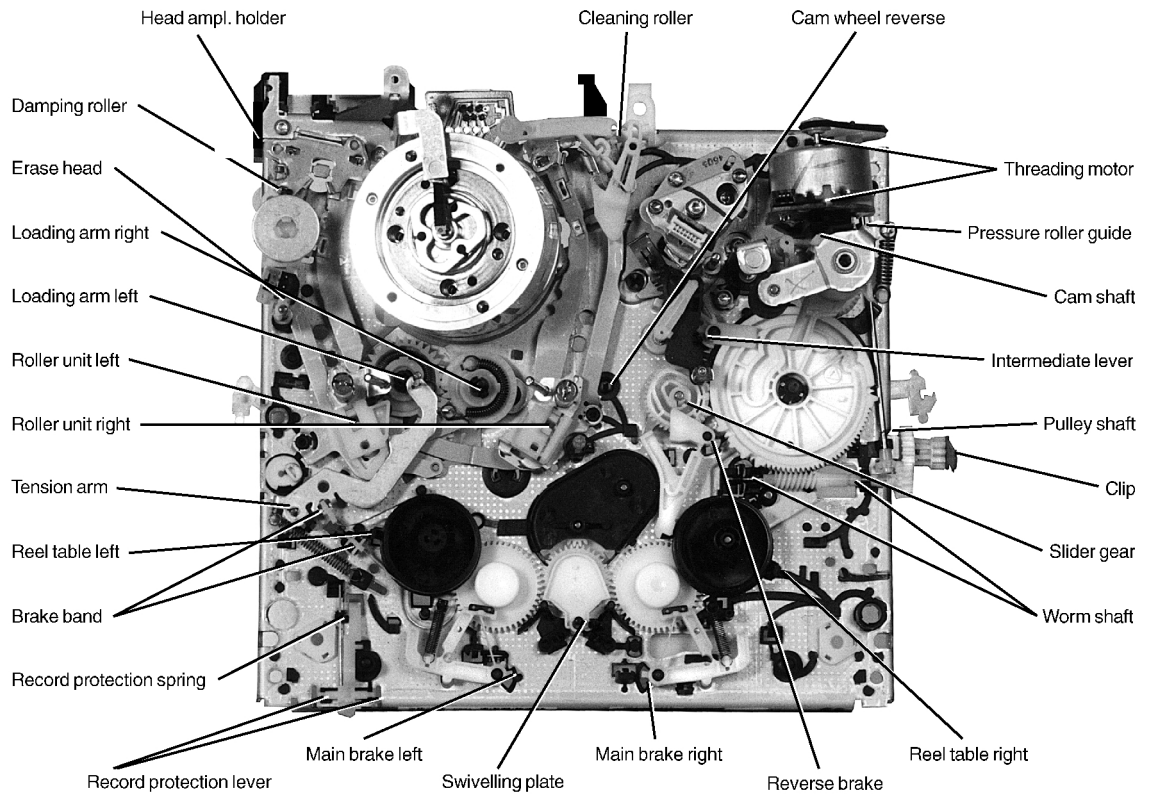


Figure 10-14

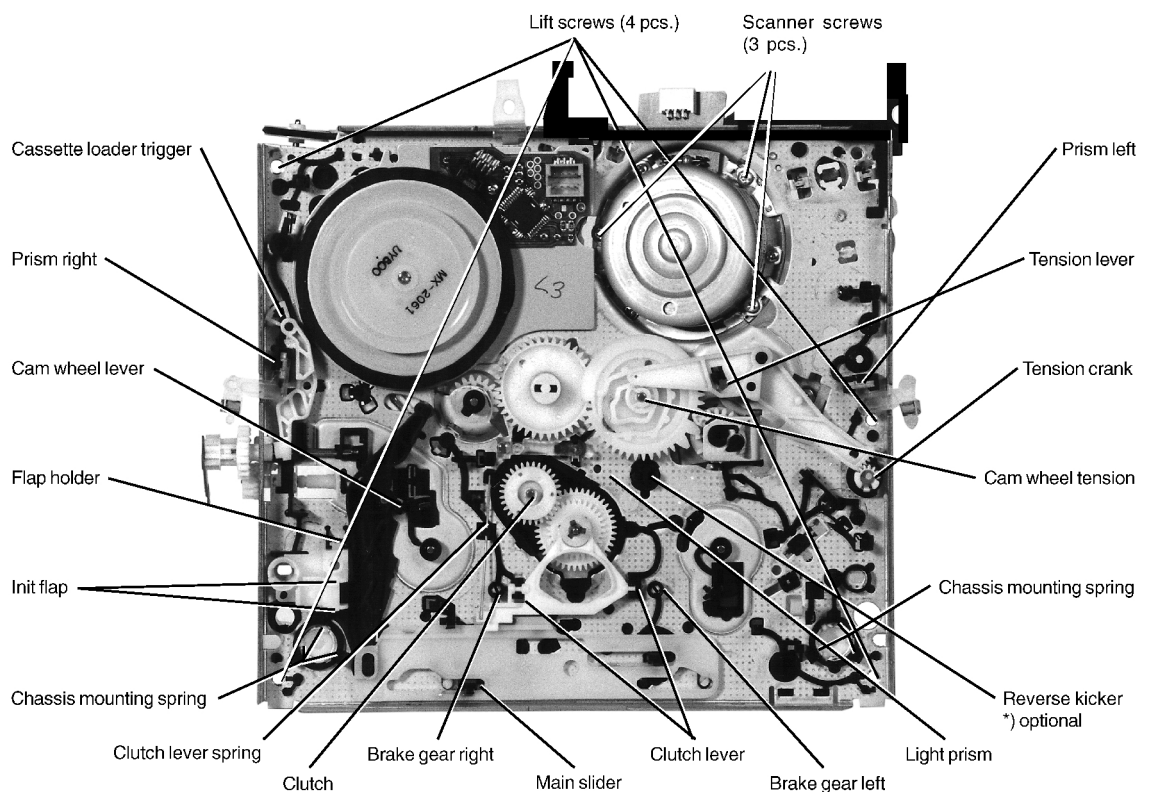


In order to make the replacement of the deck parts easier, the snap hooks are marked with an arrow.

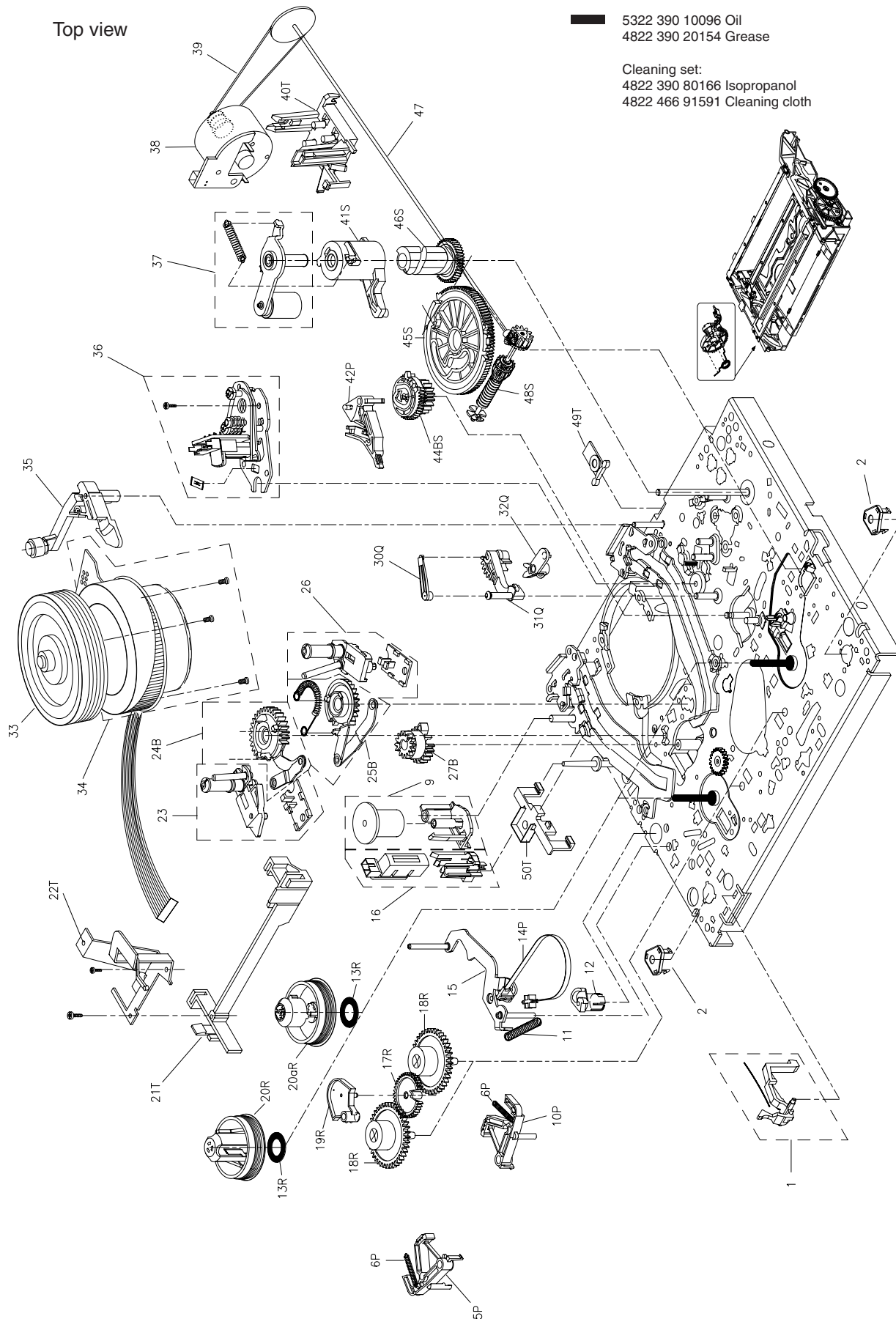
TOP VIEW



UNDERSIDE VIEW

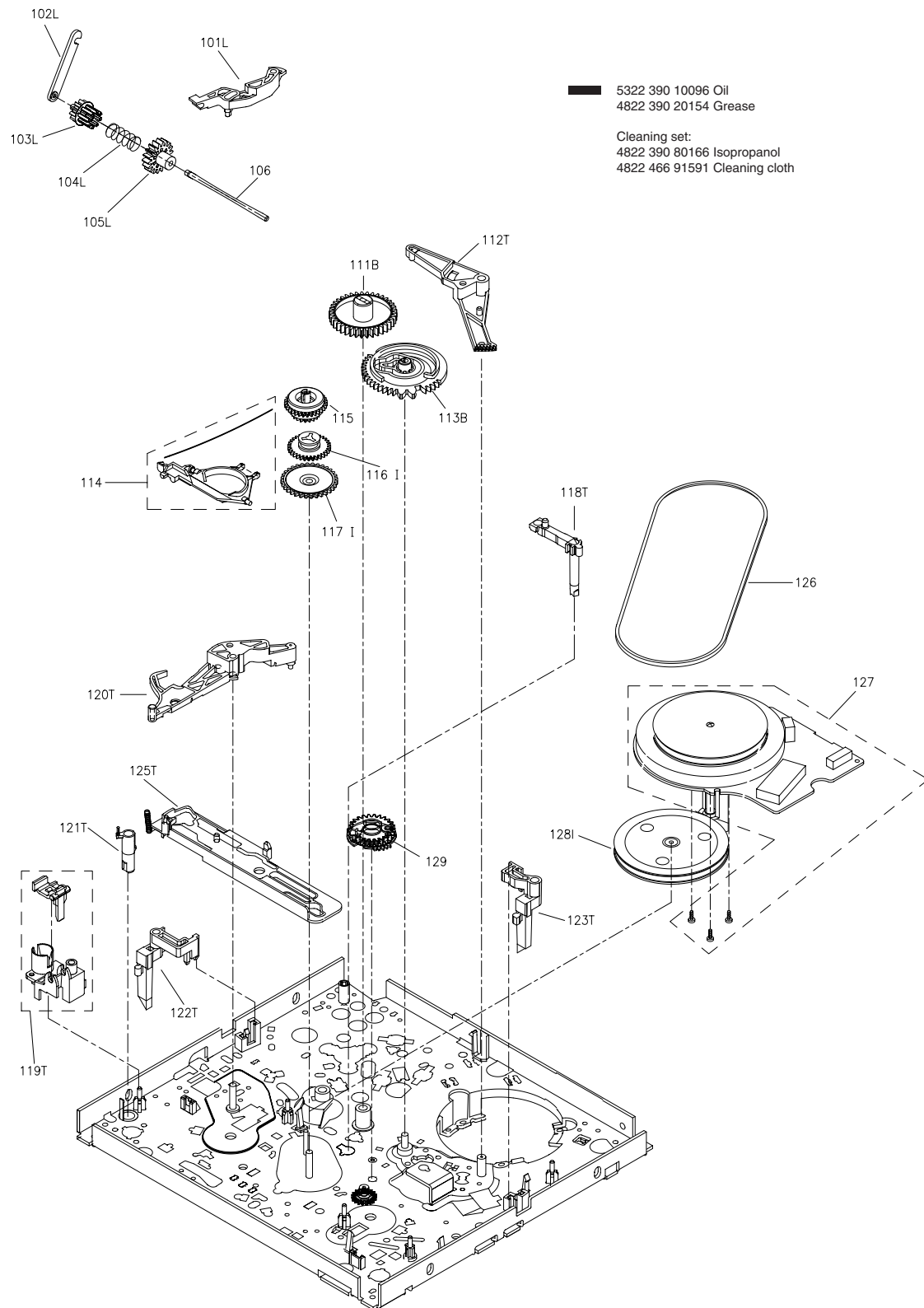


10.3 DECK EXPLODED VIEW (TOP VIEW)



10.4 DECK EXPLODED VIEW (BOTTOM VIEW)

Underside view



10.5 Mechanical parts list

Pos.	Description	K I T S							Code number 4822
		B	I	L	P	Q	S	T	
1	Rec. protection lever (with spring)								402 10202
2	Chassis mounting spring (2x)								492 71022
5	Main brake left				P				
6	Main brake spring (2x)				P				
9	Damping roller *)								528 70782
10	Main brake right				P				
11	Tension arm spring								492 33317
12	Tension crank								403 70551
13	Slip ring							U	
14	Tension band				P				
15	Tension arm								403 70547
16	Erase head								249 10522
17	Swivelling gear							U	
18	Brake gear (2x)							U	
19	Swivelling plate							U	
20	Reel table (S)							U	
20a	Reel table (T)							U	
21	Headamplifier holder						T		
22	Bracket						T		
23	Roller unit left								528 70771
24	Loading arm left	B							
25	Loading arm right	B							
26	Roller unit right								528 70772
27	Loading gear	B							
30	Reverse clip					Q			
31	Reverse lever					Q			
32	Intermediate lever					Q			
34	Scanner assy. 2/0 (Head disc and motor)								4803 218 00011
34	Scanner assy. 2/0-LP (Head disc and motor)								4803 218 00021
34	Scanner assy. 4/0 (Head disc and motor)								4803 218 00031
34	Scanner assy. 4/2 (Head disc and motor)								4803 218 00041
35	Cleaning roller								528 70773
36	A/C Head (with clip and screws)								249 10468
37	Pressure roller (with spring)								528 70774
38	Threading motor								361 10809
39	Threading belt								358 20421
40	Motor holder							T	
41	Pressure roller guide						S		
42	Reverse brake				P				
44	Slider gear	B					S		
45	Cam wheel						S		
46	Cam shaft						S		
47	Pulley shaft								528 81462
48	Worm shaft						S		
49	Chassis mounting clip							T	
50	WD-holder							T	

Pos.	Description	K I T S							Code number 4822
		B	I	L	P	Q	S	T	
101	Cassette loader trigger			L					
102	Clip			L					
103	Cassette loader gear1			L					
104	Cassette loader spring			L					
105	Cassette loader gear2			L					
106	Spindle								535 93277
111	Cam wheel reverse	B							
112	Tension lever							T	
113	Cam wheel tension	B							
114	Clutch lever (with spring)								403 70549
115	Clutch								528 20736
116	Changing gear		I						
117	Double gear		I						
118	Light prism							T	
119	Init flap and holder							T	
120	Cam wheel lever							T	
121	S-VHS lever							T	
122	Prism rihgt							T	
123	Prism left							T	
125	Main slider							T	
126	Driving belt								358 31166
127	Capstan motor (with screws)								361 10805
129	Reverse kicker with transmission gears *)								522 20451
128	Gear pulley		I						
150	Lift								443 64112
KIT	B								310 31955
KIT	I								310 31963
KIT	L								310 32116
KIT	P								310 32191
KIT	Q								310 10658
KIT	S								310 10661
KIT	T								310 10662
KIT	U						3103		109 09190

*) optional

Um eine hohen Reparaturstandard zu gewährleisten sind mit Ausnahme von Kit T immer alle im Kit enthaltenen Teile zu tauschen.

In order to guarantee a high repairstandard all spare parts included in a kit have to be replaced with the exception of kit T.

Per una riparazione garantita occorre sostituire tutti i pezzi contenuti nei kit, fatta eccezione per il kit T.

Para obtener un estándar de reparaciones elevado, es necesario cambiar todas las partes contenidas en el kit, la única excepción es para el kit T.

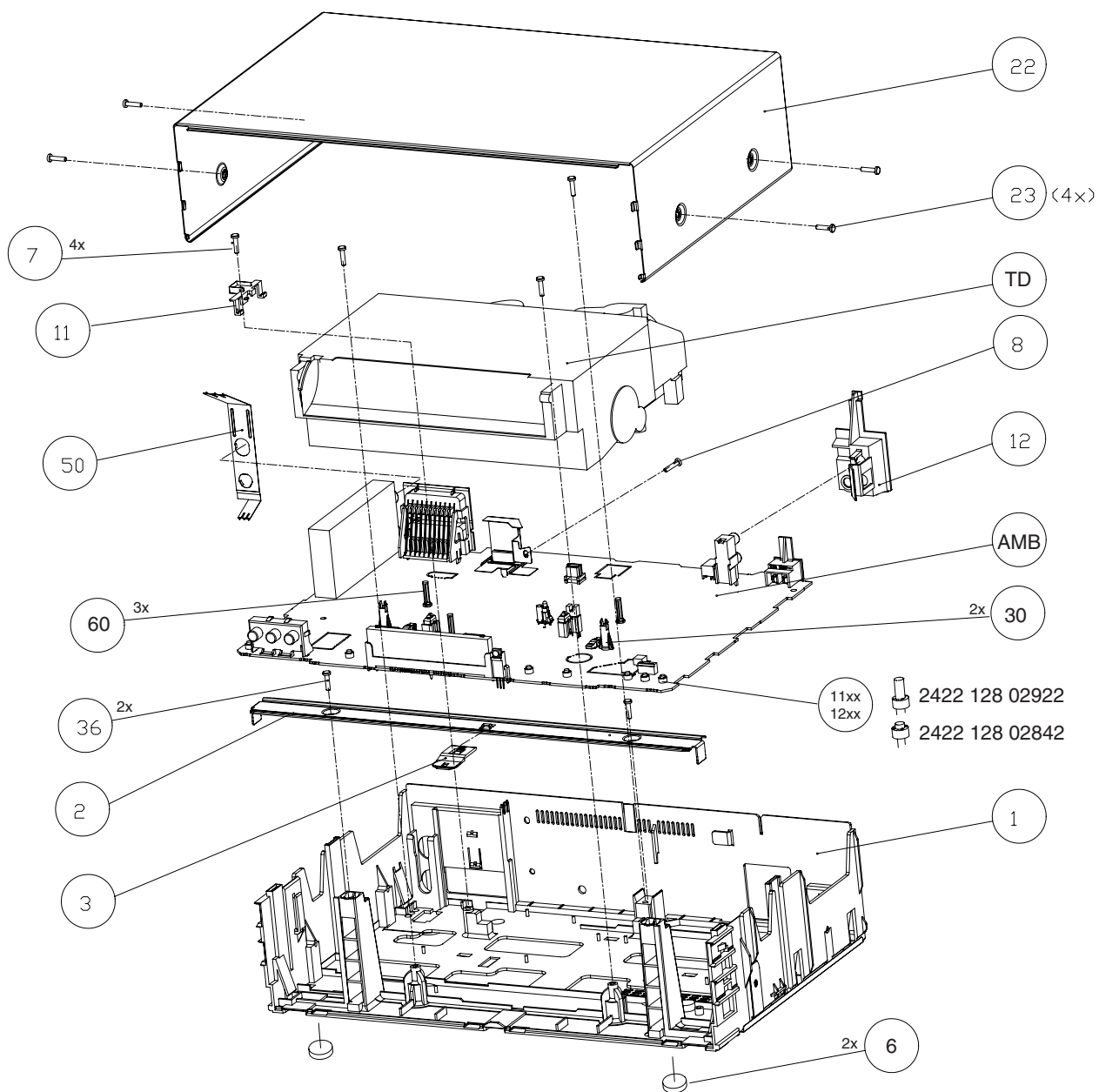
A fin d'obtenir un standard de réparations élevé, toutes les pièces de rechange incluses dans un kit sont à remplacer, exception faite du kit T.

Om een hoge reparatiekwaliteit te waarborgen moeten, met uitzondering van kit T, altijd alle zich in een kit bevindende onderdelen worden vervangen.

[illegible][illegible]

11. Exploded view and Parts list

11.1 Exploded view set



11.2 Set Parts List

Pos	Service code	Description
1	3103 138 91700	FRAME ASSY 1SCART
	3103 138 91710	FRAME ASSY 2SCART
	3103 138 90120	FRAME ASSY STEREO
2	3103 141 22800	BRACKET
3	3103 104 20960	CATCH
6	3103 184 00830	FOOT
7	3103 100 42400	SCREW 3,5X16
8	3103 100 42530	SCREENING SCREW
11	3103 104 01530	WD-HOLDER
12	3103 104 25950	CHINCH COVER

Pos	Service code	Description
22	3103 141 23590	COVER VR607, 617/02/07/16
	3103 141 23160	COVER VRx01, xxDVxx, SBxx
	3103 141 23680	COVER VR260,VR460
22	3103 141 23500	COVER VRx1x,VRx00,VR605
23	3112 400 40220	PLASTITE SCREW 3,5X10
30	3103 107 61760	DISTANZHOLDER DECK
36	2511 076 50014	TORX SCREW 3X12
50	3103 111 02560	SPRING
60	3103 104 20110	DISTANZHOLDER MOBO

11.3 Direction for use

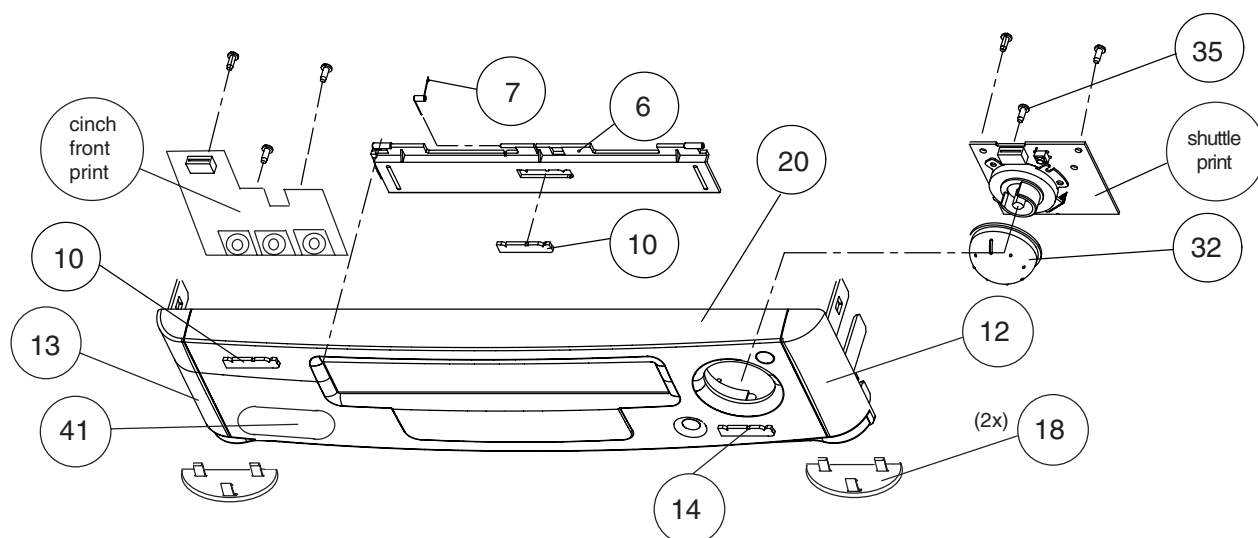
Service code	Direction for use
3103 166 25660	VR101/02 PT, ES
3103 166 25680	VR101/02 D, FR, NL, I
3103 166 25690	VR101/02 DK, FI, NO, SW
3103 166 25700	VR101/39 FR
3103 166 25710	VR101/58 EN, PL, RU, SK, TS, HU
3103 166 24690	VR110/02 PT, ES
3103 166 24700	VR110/02 GR
3103 166 24720	VR110/02 D, FR, NL, I
3103 166 24730	VR110/02 DK, FI, NO, SW
3103 166 24680	VR110/07 EN
3103 166 25020	VR110/58 EN, PL, RU, SK, TS, HU
3103 166 26040	VR200A/02 PT, ES
3103 166 26050	VR200A/02 GR
3103 166 26060	VR200A/02 DE, EN
3103 166 26070	VR200A/02 D, FR, NL, I
3103 166 26080	VR200A/02 DK, FI, NO, SW
3103 166 26300	VR200A/07 EN
3103 166 26310	VR200A/39 FR
3103 166 26320	VR200A/58 EN, PL, RU, SK, TS, HU
3103 166 24910	VR210/02 PT, ES
3103 166 24920	VR210/02 GR
3103 166 24940	VR210/02 D, FR, NL, I
3103 166 24950	VR210/02 DK, FI, NO, SW
3103 166 25040	VR210/07 EN
3103 166 25060	VR210/39 FR
3103 166 25310	VR210/58 EN, PL, RU, SK, TS, HU
3103 166 26220	VR210/60 FR
3103 166 25470	VR215/02 PT, ES
3103 166 25500	VR215/02 DK, FI, NO, SW
3103 166 25490	VR215/02 D, FR, NL, I
3103 166 26140	VR215/07 EN
3103 166 26090	VR217/02 PT, ES
3103 166 26100	VR217/02 GR
3103 166 26120	VR217/02 D, FR, NL, I
3103 166 26130	VR217/02 DK, FI, NO, SW
3103 166 27570	VR217/07 EN
3103 166 25160	VR260/02 PT, ES
3103 166 25180	VR260/02 D, FR, NL, I
3103 166 25190	VR260/02 DK, FI, NO, SW
3103 166 25320	VR260/07 EN
3103 166 25300	VR260/39 FR
3103 166 25290	VR260/58 EN, PL, RU, SK, TS, HU
3103 166 26500	VR400A/58 EN, PL, RU, SK, TS, HU
3103 166 25020	VR401/58 EN, PL, RU, SK, TS, HU
3103 166 24910	VR410/02 PT, ES
3103 166 24920	VR410/02 GR
3103 166 24940	VR410/02 D, FR, NL, I
3103 166 24950	VR410/02 DK, FI, NO, SW
3103 166 25060	VR410/39 FR
3103 166 25200	VR410/58 EN, PL, RU, SK, TS, HU
3103 166 25340	VR460/02 FR, NL, I, PT, ES
3103 166 25300	VR460/39 FR
3103 166 25290	VR460/58 EN, PL, RU, SK, TS, HU
3103 166 25730	VR501/02 D, FR, NL, I
3103 166 25740	VR501/16 FR, NL, I, PT, ES
3103 166 25750	VR501/16 DK, FI, NO, SW

Service code	Direction for use
3103 166 25770	VR501/58 EN, PL, RU, SK, TS, HU
3103 166 25080	VR510/02 D, FR, NL, I
3103 166 25090	VR510/02 GR
3103 166 25230	VR510/07 EN
3103 166 25210	VR510/16 FR, NL, I, PT, ES
3103 166 25220	VR510/16 DK, FI, NO, SW
3103 166 25510	VR510/39 FR
3103 166 25250	VR510/58 EN, PL, RU, SK, TS, HU
3103 166 27030	VR600A/02 D, FR, NL, I
3103 166 27040	VR600A/02 GR
3103 166 27580	VR600A/07 EN
3103 166 27510	VR600A/16 DK, FI, NO, SW
3103 166 27520	VR600A/16 FR, NL, PT, ES
3103 166 26400	VR600A/39 FR
3103 166 26510	VR605A/58 EN, PL, RU, SK, TS, HU
3103 166 27530	VR607A/02 D
3103 166 27610	VR607A/02 I,NL
3103 166 27560	VR607A/07 EN
3103 166 27540	VR607A/16 DK, FI, NO, SW
3103 166 27550	VR607A/16 FR, NL, PT, ES
3103 166 26410	VR607A/39 FR
3103 166 25110	VR610/02 D, FR, NL, I
3103 166 25120	VR610/02 GR
3103 166 25260	VR610/07 EN
3103 166 25350	VR610/16 FR, NL, PT, ES
3103 166 25360	VR610/16 DK, FI, NO, SW
3103 166 25520	VR610/39 FR
3103 166 26230	VR610/60 FR
3103 166 25380	VR617/02 D, FR, NL, I
3103 166 26160	VR617/07 EN
3103 166 25590	VR617/16 FR, NL, PT, ES
3103 166 25600	VR617/16 DK, FI, NO, SW
3103 166 25530	VR617/58 SK, TS, HU
3103 166 27500	VR617/58 EN, PL, RU
3103 166 24740	SB130/03 NL
3103 166 24820	SB130/38 FR
3103 166 24870	SB135/03 NL
3103 166 24880	SB135/07 EN
3103 166 24750	SB135/11 FR, NL
3103 166 24760	SB135/16 ES
3103 166 24890	SB135/38 FR
3103 166 24750	SB435/11 FR, NL
3103 166 24890	SB435/38 FR
3103 166 25000	SB535/38 FR
3103 166 24980	SB635/03 NL
3103 166 25440	SB635/11 FR, NL
3103 166 25450	SB635/16 ES
3103 166 24970	SB635/38 FR
3103 166 24980	SB735/03 NL
3103 166 25440	SB735/11 FR, NL
3103 166 24970	SB735/38 FR
3103 166 24960	20DV20/39 FR
3103 166 25030	25DV20/39 FR
3103 166 25030	45DV20/39 FR
3103 166 25890	65DV20/39 FR

Service Code	Description Control Panel pos 20
3103 138 91110	CONTROL PANEL VR101/02/58
3103 138 91120	CONTROL PANEL VR101/39,
3103 138 90100	CONTROL PANEL VR110/02/07/58
3103 138 88720	CONTROL PANEL VR200A/02
3103 138 89180	CONTROL PANEL VR200A/07
3103 138 89060	CONTROL PANEL VR200A/39
3103 138 89170	CONTROL PANEL VR200A/58
3103 138 90020	CONTROL PANEL VR210/02/58
3103 138 90300	CONTROL PANEL VR210/07
3103 138 90280	CONTROL PANEL VR210/39/60
3103 138 90040	CONTROL PANEL VR215/02
3103 138 90310	CONTROL PANEL VR215/07
3103 138 90470	CONTROL PANEL VR217/02
3103 138 91460	CONTROL PANEL VR217/07
3103 138 90050	CONTROL PANEL VR260/02/58
3103 138 90340	CONTROL PANEL VR260/07
3103 138 90320	CONTROL PANEL VR260/39
3103 138 89160	CONTROL PANEL VR400A/58
3103 138 91010	CONTROL PANEL VR401/58
3103 138 90350	CONTROL PANEL VR410/02/58
3103 138 90360	CONTROL PANEL VR410/39
3103 138 90380	CONTROL PANEL VR460/02/58
3103 138 90110	CONTROL PANEL VR460/39
3103 138 91140	CONTROL PANEL VR501/02
3103 138 91170	CONTROL PANEL VR501/16/58
3103 138 90400	CONTROL PANEL VR510/02
3103 138 90420	CONTROL PANEL VR510/07
3103 138 90410	CONTROL PANEL VR510/16/58
3103 138 90010	CONTROL PANEL VR510/39
3103 138 88750	CONTROL PANEL VR600A/02
3103 138 89260	CONTROL PANEL VR600A/07
3103 138 89270	CONTROL PANEL VR600A/16
3103 138 89250	CONTROL PANEL VR600A/39
3103 138 89210	CONTROL PANEL VR605A/58
3103 138 90180	CONTROL PANEL VR607A/02
3103 138 90160	CONTROL PANEL VR607A/07
3103 138 90170	CONTROL PANEL VR607A/16
3103 138 90200	CONTROL PANEL VR607A/39
3103 138 90430	CONTROL PANEL VR610/02
3103 138 90440	CONTROL PANEL VR610/07
3103 138 90450	CONTROL PANEL VR610/16
3103 138 90260	CONTROL PANEL VR610/39/60
3103 138 90460	CONTROL PANEL VR617/02
3103 138 90070	CONTROL PANEL VR617/07
3103 138 91730	CONTROL PANEL VR617/16
3103 138 90480	CONTROL PANEL VR617/58
3103 138 90490	CONTROL PANEL SB130/03
3103 138 90500	CONTROL PANEL SB130/38
3103 138 90550	CONTROL PANEL SB135/03
3103 138 90540	CONTROL PANEL SB135/07
3103 138 90520	CONTROL PANEL SB135/11
3103 138 90530	CONTROL PANEL SB135/16
3103 138 90510	CONTROL PANEL SB135/38
3103 138 90560	CONTROL PANEL SB435/11
3103 138 90570	CONTROL PANEL SB435/38
3103 138 90580	CONTROL PANEL SB535/38
3103 138 90620	CONTROL PANEL SB635/03
3103 138 90630	CONTROL PANEL SB635/11
3103 138 90610	CONTROL PANEL SB635/16
3103 138 90600	CONTROL PANEL SB635/38
3103 138 90660	CONTROL PANEL SB735/03
3103 138 90650	CONTROL PANEL SB735/11
3103 138 90640	CONTROL PANEL SB735/38
3103 138 90690	CONTROL PANEL 20DV20/39
3103 138 90700	CONTROL PANEL 25DV20/39
3103 138 90710	CONTROL PANEL 45DV20/39
3103 138 90720	CONTROL PANEL 65DV20/39

Service Code	Description Lift Flap pos 6
3103 178 29670	LIFT FLAP VR101/02/58
3103 178 29680	LIFT FLAP VR101/39
3103 178 28620	LIFT FLAP VR110/02/07/58
3103 178 25180	LIFT FLAP VR200A/02/07
3103 178 25240	LIFT FLAP VR200A/39
3103 178 25190	LIFT FLAP VR200A/58
3103 178 28830	LIFT FLAP VR210/02/07/39/58/60
3103 178 29320	LIFT FLAP VR215/02/07, VR217/07
3103 178 31200	LIFT FLAP VR217/02
3103 178 29180	LIFT FLAP VR260/02/07/58
3103 178 29280	LIFT FLAP VR260/39
3103 178 25170	LIFT FLAP VR400A/58
3103 178 29190	LIFT FLAP VR401/58
3103 178 28980	LIFT FLAP VR410/02/58
3103 178 29020	LIFT FLAP VR410/39
3103 178 29350	LIFT FLAP VR460/02/58
3103 178 29560	LIFT FLAP VR460/39
3103 178 29690	LIFT FLAP VR501/02/16/58
3103 178 28950	LIFT FLAP VR510/02/07/16/58
3103 178 29580	LIFT FLAP VR510/39
3103 178 25460	LIFT FLAP VR600A/02
3103 178 25540	LIFT FLAP VR600A/07/16
3103 178 25510	LIFT FLAP VR600A/39
3103 178 26170	LIFT FLAP VR605A/58
3103 178 28250	LIFT FLAP VR607A/02
3103 178 28200	LIFT FLAP VR607A/07/16/39
3103 178 29070	LIFT FLAP VR610/02/07/16
3103 178 29610	LIFT FLAP VR610/39/60
3103 178 31210	LIFT FLAP VR617/02/16/07
3103 178 29380	LIFT FLAP VR617/58
3103 178 28630	LIFT FLAP SB130/03
3103 178 28690	LIFT FLAP SB130/38
3103 178 28710	LIFT FLAP SB135/03
3103 178 28720	LIFT FLAP SB135/07
3103 178 28640	LIFT FLAP SB135/11
3103 178 28650	LIFT FLAP SB135/16
3103 178 28730	LIFT FLAP SB135/38
3103 178 28750	LIFT FLAP SB435/11
3103 178 28900	LIFT FLAP SB435/38
3103 178 28890	LIFT FLAP SB535/38
3103 178 28880	LIFT FLAP SB635/03
3103 178 29250	LIFT FLAP SB635/11
3103 178 29530	LIFT FLAP SB635/16
3103 178 28870	LIFT FLAP SB635/38
3103 178 28860	LIFT FLAP SB735/03
3103 178 30200	LIFT FLAP SB735/11
3103 178 29540	LIFT FLAP SB735/38
3103 178 28910	LIFT FLAP 20DV20/39
3103 178 29120	LIFT FLAP 25DV20/39
3103 178 29940	LIFT FLAP 45DV20/39
3103 178 29950	LIFT FLAP 65DV20/39

11.4 Front Parts List



Pos	Service code	Description
7	3103 111 02450	LEG SPRING
10	3112 210 06760	WORDMARK PHILIPS VR200,400
	3103 110 00960	WORDMARK PHILIPS VR607
	3112 210 06760	WORDMARK PHILIPS VR110,401,501,60x
	3103 110 01530	WORDMARK PHILIPS VR21x,x60,410,61x,510
12	3103 104 25620	SIDE CAP RIGHT VR610,617
13	3103 104 25610	SIDE CAP LEFT VR610,617
14	3103 110 01510	WORDMARK TURBO DRIVE VR607
	3103 110 01480	WORDMARK TURBO DRIVE VR600
18	3103 178 28050	FOOT ASSY VR600,605
	3103 178 28260	FOOT ASSY VR607
	3103 178 29100	FOOT ASSY VR610,617
32	3103 178 28270	SHUTTLE KNOB ASSY VR607
	3103 178 25320	SHUTTLE KNOB ASSY VR605
35	3103 100 41430	SCREW 2.9 x 8
41	3103 178 29140	AV-COVER GB VR260,460
	3103 178 29260	AV-COVER F VR260,460
	3103 178 25430	AV-COVER GB VR600
	3103 178 25500	AV-COVER F VR600
	3103 178 28210	AV-COVER GB VR607
	3103 178 28280	AV-COVER F VR607
	3103 178 29130	AV-COVER GB VR610,617
	3103 178 29590	AV-COVER F VR610
	4822 214 13088	ASP10 SHUTTLE PRINT
	310 319 884 520	ACP10 CINCH PRINT FRONT
12	310 317 831 330	SIDE CAP RIGHT SILVER VR617/02/07/16
13	310317831340	SIDE CAP LEFT SILVER VR617/02/07/16
18	310317831310	FOOT ANY SILVER VR617/02/07/16
41	310317831350	AV-COVER SILVER VR617/02/07/16

12. Spare parts list

MOBO			
Various			
1300▲	3103 100 23910	MAINS PLUG	
1708	2422 034 11514	CONNECTOR 1 PIN	
1911	2422 025 14521	CONNECTOR 11 PIN	
1912	8203 107 91680	CONNECTOR 9 PIN	
1941	2422 026 04294	PHONES CONNECTOR	
1946	3103 107 20720	CAPSTAN CONNECT.	
1947	2422 025 14512	CONNECTOR 3 PIN	
1948	2422 025 14515	CONNECTOR 6 PIN	
1951	3103 100 24010	SCART SOCKET E1	
1952	3103 100 24210	SCART SOCKET E2	
1954	3103 100 24250	TRIPLE PIN JACK	
1955	2422 025 14515	CONNECTOR 6 PIN	
1956	2422 026 05087	CINCH CONNECTOR	
1961	2422 025 09405	CONNECTOR 2 PIN	
1965	2422 025 14516	CONNECTOR 7 PIN	
1969	2422 025 14532	CONNECTOR 3 PIN	
1982	2422 025 16742	CONNECTOR 8 PIN	
0005	3103 104 25900	DISPLAY HOLDER	
0007	3103 107 61690	TACHO-HOLDER	
0008	3103 107 61840	TACHO-HOLDER	
0020	3103 150 12050	SENSORHOLDER	
0021	3103 107 61680	SENSORHOLDER	
0022	3103 150 12050	SENSORHOLDER	
0200	3103 107 20430	CONNECTOR 7P	
1001	2422 543 01125	CRYSTAL 4.43MHz	
1101	2422 128 02842	SWITCH short	
1101	2422 128 02922	SWITCH long	
1102	2422 128 02707	SWITCH	
1105	2422 128 02922	SWITCH	
1105	2422 128 02842	SWITCH	
1108	2422 128 02707	SWITCH	
1109	2422 128 02842	SWITCH	
1114	2422 128 02707	SWITCH	
1118	2422 128 02842	SWITCH	
1119	2422 128 02842	SWITCH	
1119	2422 128 02707	SWITCH	
1119	2422 128 02922	SWITCH	
1122	2422 128 02842	SWITCH	
1123	2422 128 02842	SWITCH	
1123	2422 128 02707	SWITCH	
1124	2422 128 02707	SWITCH	
1125	2422 128 02922	SWITCH	
1127	2422 128 02842	SWITCH	
1151	2422 128 02842	SWITCH	
1152	2422 128 02842	SWITCH	
1152	2422 128 02922	SWITCH	
1153	2422 128 02922	SWITCH	
1156	2422 128 02922	SWITCH	
1156	2422 128 02842	SWITCH	
1157	2422 128 02842	SWITCH	
1158	2422 128 02922	SWITCH	
1159	2422 128 02707	SWITCH	
1161	2422 128 02842	SWITCH	
1162	2422 128 02842	SWITCH	
1163	2422 128 02842	SWITCH	
1170	2422 543 00056	CRYSTAL 32.768kHz	
1171	2422 543 00761	CRYSTAL 16MHz	
1201	2422 128 02842	SWITCH	
1204	2422 128 02842	SWITCH	
1204	2422 128 02922	SWITCH	
1204	2422 128 02707	SWITCH	
1207	2422 128 02707	SWITCH	
1208	2422 128 02842	SWITCH	
1210	2422 128 02707	SWITCH	
1210	2422 128 02842	SWITCH	
1213	2422 128 02842	SWITCH	
1213	2422 128 02922	SWITCH	
1216	2422 128 02707	SWITCH	
1216	2422 128 02842	SWITCH	
1217	2422 128 02922	SWITCH	
1217	2422 128 02842	SWITCH	
1218	2422 128 02707	SWITCH	
1221	2422 128 02707	SWITCH	
1221	2422 128 02842	SWITCH	
1222	2422 128 02842	SWITCH	
1222	2422 128 02922	SWITCH	
1253	2422 128 02707	SWITCH	
1301▲	3103 138 86490	FUSE T1.25A	
1302▲	2422 549 43073	SURGE PROTECT	
1304▲	2422 086 10919	PROT 125mA	
1306▲	2422 086 10956	PROT 1.6A	
1308▲	2422 086 10955	PROT 1.25A	
1309▲	2422 086 10514	FUSE T100mA	
1501▲	2422 086 10919	PROT 125mA	
1701	2422 542 90082	TUMOD TCBZ4-004A SEC BOOST	2079 3198 016 08290 82 pF 50V
1702	2422 542 90081	TUMOD TCBZ4-002A BG//DK	2080 3198 016 01010 100 pF 50V
1703	2422 549 44341	OFWK9656M	2082 3198 017 01030 10 nF 50V
1704	2422 549 42004	OFWK2955M	2083 3198 017 01030 10 nF 50V
1704	2422 549 42273	OFWJ1980M	2084 3198 029 31090 10 μF 25V
1704	2422 549 42068	OFWG3956M	2085 3198 017 24740 470 nF 16V
1704	2422 549 41518	OFWG1961M	2086 3198 017 01030 10 nF 50V
1704	2422 549 41801	OFWG1984M	2087 3198 016 06810 680 pF 50V
1704	9322 042 72682	OFWK3953M	2088 3198 017 21050 1 μF 16V
1705	2422 549 42391	FILTER TPW 6.0/6.5MHz	2089 3198 017 02230 22 nF 50V
1705	2422 549 41433	FILTER TPS 6.5MHz	2090 3198 016 02210 220 pF 50V
1705	2422 549 41595	FILTER BS 5.5MHz	2096 3198 017 01040 100 nF 16V
1706	2422 549 42824	FILTER EFC 5.5MHz	2097 3198 016 01090 10 pF 50V
1706	2422 549 42825	FILTER EFC 6.0MHz	2170 3198 029 22290 22 μF 16V
1706	2422 549 42826	FILTER EFC 6.5MHz	2171 3198 023 21040 100 nF 25V
1707	2422 549 42825	FILTER EFC 6.0MHz	2173 3198 023 21040 100 nF 25V
1707	2422 549 42826	FILTER EFC 6.5MHz	2174 2020 025 90019 220 mF 5.5V
1760	2422 543 01119	CRYSTAL 4MHz	2175 3198 016 01890 18 pF 50V
1761	2422 543 00781	CRYSTAL 18.432MHz	2176 3198 016 01590 15 pF 50V
1801	3103 107 90110	SWITCH ASSY	2177 3198 016 02290 22 pF 50V
1802	3103 107 90110	SWITCH ASSY	2178 3198 016 02290 22 pF 50V
-II-			
2000	3198 017 21040	100 nF 50V	2179 3198 017 24740 470 nF 16V
2001	3198 017 01030	10 nF 50V	2180 3198 017 01030 10 nF 50V
2002	3198 017 01030	10 nF 50V	2181 3198 023 21040 100 nF 25V
2003	3198 029 31090	10 μF 25V	2182 3198 029 24790 47 μF 16V
2004	3198 017 01030	10 nF 50V	2300 3198 017 01040 100 nF 16V
2005	3198 017 21040	100 nF 50V	2301 3198 025 51090 10 μF 50V
2006	3198 029 31090	10 μF 25V	2302 2020 558 90442 47 pF 2kV
2007	3198 017 01030	10 nF 50V	2303 3198 017 03320 3.3 nF 50V
2008	3198 017 02230	22 nF 50V	2304 2020 558 90442 47 pF 2kV
2009	3198 017 21050	1 μF 16V	2305 2020 021 91536 330 μF 16V
2010	3198 017 21050	1 μF 16V	2308 2022 318 00108 47 nF 250V
2011	3198 017 02230	22 nF 50V	2309 2020 021 91332 47 nF 50V
2012	3198 017 01030	10 nF 50V	2310 2020 021 91529 22 μF 50V
2013	3198 017 01030	10 nF 50V	2311 2020 021 91527 100 μF 10V
2014	3198 017 24730	47 nF 50V	2312 2020 021 91528 560 μF 6.3V
2015	3198 017 01030	10 nF 50V	2313 3198 025 01020 1000 μF 6.3V
2016	3198 017 01030	10 nF 50V	2314 3198 023 21040 100 nF 25V
2017	3198 017 21050	1 μF 16V	2315 3198 017 01030 10 nF 50V
2018	3198 017 21040	100 nF 50V	2316 2022 330 00014 100 nF 275V
2019	3198 029 31090	10 μF 25V	2317▲ 2020 554 90127 2.2 nF 250V
2020	3198 029 31090	10 μF 25V	2318 2020 021 91525 18 μF 385V
2021	3198 017 01040	100 nF 16V	2319 3198 025 51090 10 μF 50V
2022	3198 029 31090	10 μF 25V	2325 3198 017 01030 10 nF 50V
2023	3198 017 21050	1 μF 16V	2327 3198 017 01040 100 nF 16V
2024	3198 029 04790	47 μF 6.3V	2328 2222 910 16649 100 nF 25V
2025	3198 017 01030	10 nF 50V	2328 2238 910 15649 100 nF 25V
2026	3198 017 21040	100 nF 50V	2459 3198 017 02230 22 nF 50V
2027	3198 017 21050	1 μF 16V	2460 8203 107 21070 68 pF 50V
2028	3198 017 21040	100 nF 50V	2461 3198 029 21010 100 μF 16V
2029	3198 017 21040	100 nF 50V	2462 2020 012 93691 220 μF 16V
2030	3198 017 01030	10 nF 50V	2463 3198 017 21040 100 nF 50V
2031	3198 017 24740	470 nF 16V	2464 3198 017 21040 100 nF 50V
2032	3198 016 02790	27 pF 50V	2465 3198 023 04730 47 nF 25V
2033	3198 017 01030	10 nF 50V	2466 3198 023 04730 47 nF 25V
2034	3198 017 01020	1 nF 50V	2467 3198 023 04730 47 nF 25V
2035	3198 029 22290	22 μF 16V	2468 2022 552 05236 5.6 nF 50V
2036	3198 029 31090	10 μF 25V	2469 3198 017 01040 100 nF 16V
2037	3198 017 21050	1 μF 16V	2470 3198 029 21010 100 μF 16V
2038	3198 023 21040	100 nF 25V	2471 3198 017 01040 100 nF 16V
2039	3198 017 21050	1 μF 16V	2472 3198 017 02230 22 nF 50V
2040	3198 017 01030	10 nF 50V	2473 3198 017 01030 10 nF 50V
2041	3198 025 54780	4.7 μF 50V	2474 3198 017 21040 100 nF 50V
2042	3198 017 01040	100 nF 16V	2475 3198 016 01010 100 pF 50V
2043	3198 029 31090	10 μF 25V	2476 3198 017 01040 100 nF 16V
2044	3198 017 21040	100 nF 50V	2477 3198 017 03330 33 nF 50V
2045	3198 017 01040	100 nF 16V	2479 3198 017 04720 4.7 nF 50V
2046	3198 016 02210	220 pF 50V	2480 3198 017 02220 2.2 nF 50V
2047	3198 016 04780	4.7 pF 50V	2481 3198 029 24790 47 μF 16V
2048	2022 552 05334	180 pF 50V	2482 3198 017 21040 100 nF 50V
2049	3198 017 01030	10 nF 50V	2483 3198 017 01030 10 nF 50V
2050	3198 016 02290	22 pF 50V	2484 3198 017 01030 10 nF 50V
2051	2238 861 14391	390 pF 50V	2485 3198 017 21040 100 nF 50V
2053	3198 017 01030	10 nF 50V	2486 3198 017 04720 4.7 nF 50V
2054	3198 017 01030	10 nF 50V	2487 3198 025 31010 100 μF 25V
2055	3198 016 02790	27 pF 50V	2488 3198 029 31090 10 μF 25V
2056	3198 016 04790	47 pF 50V	2490 3198 025 21010 100 μF 16V
2071	3198 017 01030	10 nF 50V	2492 2020 800 00151 50 pF 100V TRIM
2072	3198 016 01510	150 pF 50V	2500 3198 029 02210 220 μF 6.3V
2073	3198 029 21010	100 μF 16V	2501 3198 023 21040 100 nF 25V
2074	2022 552 05335	220 pF 50V	2502 3198 023 21040 100 nF 25V
2075	3198 017 01030	10 nF 50V	2503 3198 023 21040 0

2532	3198 017 02220	2.2 nF 50V	2760	3198 017 03320	3.3 nF 50V	3016	2120 108 92621	2.7 k 1%
2533	3198 017 02220	2.2 nF 50V	2761	3198 017 01040	100 nF 16V	3017	2120 108 92618	1.8 k 1%
2534	3198 016 01810	180 pF 50V	2763	3198 016 06810	680 pF 50V	3018	3198 021 51020	1 k 0.1W
2535	3198 016 01810	180 pF 50V	2764	3198 017 01030	10 nF 50V	3019	2322 156 26801	680 Ω 1%
2536	3198 017 21050	1 μF 16V	2765	3198 017 01040	100 nF 16V	3020	2120 108 92624	4.7 k 1%
2537	3198 017 21050	1 μF 16V	2766	3198 029 31090	10 μF 25V	3021	3198 021 51510	150 Ω 0.1W
2601	3198 023 21040	100 nF 25V	2767	3198 017 01030	10 nF 50V	3022	3198 011 01020	1 k 0.17W
2602	3198 029 22290	22 μF 16V	2768	3198 029 31090	10 μF 25V	3023	3198 021 54730	47 k 0.1W
2603	3198 029 24790	47 μF 16V	2769	3198 029 31090	10 μF 25V	3024	3198 011 04730	47 k 0.17W
2604	3198 023 21040	100 nF 25V	2770	3198 017 24740	470 nF 16V	3025	3198 021 52210	220 Ω 0.1W
2605	3198 023 21040	100 nF 25V	2771	3198 016 04790	47 pF 50V	3026	3198 021 51050	1 M 0.1W
2606	3198 023 21040	100 nF 25V	2772	3198 016 06810	680 pF 50V	3027	3198 021 51080	1 Ω
2607	3198 029 24790	47 μF 16V	2773	3198 017 03320	3.3 nF 50V	3028	3198 021 51510	150 Ω 0.1W
2608	3198 017 01030	10 nF 50V	2775	3198 017 01030	10 nF 50V	3070	3198 021 51020	1 k 0.1W
2609	3198 029 24790	47 μF 16V	2776	3198 025 54780	4.7 μF 50V	3071	3198 011 04730	47 k 0.17W
2610	3198 029 31090	10 μF 25V	2778	3198 017 24740	470 nF 16V	3072	3198 021 51520	1.5 k 0.1W
2611	3198 023 21040	100 nF 25V	2779	3198 017 24740	470 nF 16V	3073	3198 021 58220	8.2 k 0.1W
2612	3198 017 21050	1 μF 16V	2780	2022 552 05344	4.7 nF 50V	3074	2120 108 92514	15 k 1%
2613	3198 029 31090	10 μF 25V	2781	3198 017 24740	470 nF 16V	3075	3198 021 51040	100 k 0.1W
2614	3198 023 21040	100 nF 25V	2782	3198 029 24790	47 μF 16V	3076	3198 021 51030	10 k 0.1W
2615	3198 016 03310	330 pF 50V	2783	3198 017 01040	100 nF 16V	3078	3198 021 51830	18 k 0.1W
2616	3198 017 01020	1 nF 50V	2784	3198 016 04790	47 pF 50V	3079	3198 021 56810	680 Ω 0.1W
2617	3198 017 02220	2.2 nF 50V	2785	3198 017 24740	470 nF 16V	3082	3198 011 06820	6.8 k 0.17W
2618	3198 023 04730	47 nF 25V	2786	3198 017 24740	470 nF 16V	3083	3198 021 51020	1 k 0.1W
2619	2022 552 05341	820 pF 50V	2787	3198 016 03380	3.3 pF 50V	3084	3198 021 52230	22 k 0.1W
2620	3198 029 24790	47 μF 16V	2788	3198 016 03380	3.3 pF 50V	3085	3198 021 52730	27 K 0.1W
2621	3198 017 01030	10 nF 50V	2789	3198 017 01030	10 nF 50V	3086	3198 021 52720	2.7 k 0.1W
2623	3198 016 01020	1 nF 50V	2790	3198 029 31090	10 μF 25V	3087	3198 021 51030	10 k 0.1W
2624	3198 029 21010	100 μF 16V	2791	3198 017 01030	10 nF 50V	3088	2120 368 90124	22 k POT
2625	2020 300 90611	27 nF 50V	2792	3198 016 04790	47 pF 50V	3089	2120 368 90119	1 k POT
2626	3198 017 04720	4.7 nF 50V	2793	3198 017 01020	1 nF 50V	3091	3198 021 58220	8.2 k 0.1W
2627	2022 552 05234	3.9 pF 50V	2794	3198 017 01020	1 nF 50V	3092	3198 011 04730	47 k 0.17W
2628	3198 029 22290	22 μF 16V	2795	3198 016 01590	15 pF 50V	3094	3198 021 51230	12 k 0.1W
2630	3198 017 01030	10 nF 50V	2800	3198 017 01040	100 nF 16V	3095	3198 021 56810	680 Ω 0.1W
2631	3198 017 02220	2.2 nF 50V	2801	3198 016 02210	220 pF 50V	3107	3198 021 54730	47 k 0.1W STBY
2632	3198 017 21050	1 μF 16V	2802	3198 017 02220	2.2 nF 50V	3108	3198 021 54730	47 k 0.1W STBY
2633	3198 029 31090	10 μF 25V	2803	3198 025 32210	220 μF 25V	3110	3198 021 54730	47 k 0.1W STBY
2650	3198 029 31090	10 μF 25V	2805	3198 017 02220	2.2 nF 50V	3111	3198 021 51080	1 Ω DOWN
2651	3198 029 31090	10 μF 25V	2809	3198 029 21010	100 μF 16V	3112	3198 021 51040	100 k 0.1W REC
2652	3198 023 21040	100 nF 25V	2812	3198 016 03390	33 pF 50V	3115	3198 021 51040	100 k 0.1W REC
2653	3198 017 06820	6.8 nF 50V	2814	3198 016 06890	68 pF 50V	3115	3198 021 54710	470 Ω 0.1W UP
2654	3198 017 01030	10 nF 50V	2815	3198 016 06890	68 pF 50V	3116	3198 021 54730	47 k 0.1W STBY
2655	3198 029 24790	47 μF 16V	2901	3198 017 01040	100 nF 16V	3119	3198 021 54710	470 Ω 0.1W UP
2656	3198 029 31090	10 μF 25V	2902	3198 029 24790	47 μF 16V	3119	3198 021 51040	100 k 0.1W REC
2657	3198 023 22240	220 nF 25V	2903	3198 029 31090	10 μF 25V	3120	3198 021 51080	1 Ω DOWN
2658	3198 023 22240	220 nF 25V	2904	3198 029 31090	10 μF 25V	3120	3198 021 51040	100 k 0.1W REC
2659	3198 023 22240	220 nF 25V	2905	3198 017 21040	100 nF 50V	3120	3198 021 52220	2.2 k 0.1W MONITOR
2660	3198 029 52280	2.2 μF 50V	2906	3198 016 02290	22 pF 50V	3135	3198 021 51080	1 Ω DOWN
2661	3198 023 22240	220 nF 25V	2907	3198 017 21040	100 nF 50V	3136	3198 021 51080	1 Ω DOWN
2662	3198 023 22240	220 nF 25V	2908	3198 029 31090	10 μF 25V	3140	3198 021 51040	100 k 0.1W REC
2663	3198 029 52280	2.2 μF 50V	2909	3198 017 21040	100 nF 50V	3140	3198 021 52220	2.2 k 0.1W MONITOR
2664	3198 023 22240	220 nF 25V	2910	3198 017 21040	100 nF 50V	3140	3198 021 54710	470 Ω 0.1W UP
2665	3198 023 22240	220 nF 25V	2911	3198 017 21040	100 nF 50V	3141	3198 021 52220	2.2 k 0.1W MONITOR
2666	3198 023 22240	220 nF 25V	2912	3198 017 21040	100 nF 50V	3142	3198 021 51830	18 k 0.1W STOP/EJECT
2667	3198 017 22250	2.2 μF 10V	2913	3198 017 21040	100 nF 50V	3146	3198 021 51040	100 k 0.1W REC
2668	3198 017 22250	2.2 μF 10V	2914	3198 017 21040	100 nF 50V	3150	3198 021 51830	18 k 0.1W STOP/EJECT
2669	3198 023 21040	100 nF 25V	2915	3198 029 31090	10 μF 25V	3150	3198 021 51080	1 Ω DOWN
2670	3198 023 22240	220 nF 25V	2916	3198 016 04710	470 pF 50V	3154	3198 021 51830	18 k 0.1W STOP/EJECT
2671	3198 029 31090	10 μF 25V	2917	3198 016 04710	470 pF 50V	3154	3198 021 58220	8.2 k 0.1W PLAY
2672	3198 029 52280	2.2 μF 50V	2918	3198 016 04710	470 pF 50V	3156	3198 021 53920	3.9 k 0.1W REW
2673	3198 029 21010	100 μF 16V	2919	3198 016 04710	470 pF 50V	3156	3198 021 54710	470 Ω 0.1W UP
2674	3198 017 02230	22 nF 50V	2920	3198 016 04710	470 pF 50V	3157	3198 021 53920	3.9 k 0.1W REW
2675	3198 029 24790	47 μF 16V	2921	3198 016 04710	470 pF 50V	3159	3198 021 58220	8.2 k 0.1W PLAY
2676	3198 017 21050	1 μF 16V	2922	3198 029 31090	10 μF 25V	3161	3198 021 53920	3.9 k 0.1W REW
2678	3198 017 01040	100 nF 16V	2923	3198 029 02210	220 μF 6.3V	3161	3198 021 58220	8.2 k 0.1W PLAY
2679	3198 029 31090	10 μF 25V	2924	3198 016 06890	68 pF 50V	3163	3198 021 55620	5.6 k 0.1W WIND
2680	3198 017 06820	6.8 nF 50V	2926	3198 016 01010	100 pF 50V	3170▲	2120 106 90603	470 Ω 0.1W
2681	3198 029 04790	47 μF 6.3V	2927	3198 016 01010	100 pF 50V	3171	3198 021 51830	18 k 0.1W
2700	3198 016 01090	10 pF 50V	2928	3198 017 21050	1 μF 16V	3172	3198 021 52210	220 Ω 0.1W
2701	2020 021 91355	2.2 μF 50V	2929	3198 017 21050	1 μF 16V	3173	3198 021 51080	1 Ω
2702	3198 023 21040	100 nF 25V	2930	3198 017 01020	1 nF 50V	3173	3198 021 55620	5.6 k 0.1W
2703	3198 029 22290	22 μF 16V	2931	3198 017 01020	1 nF 50V	3174	3198 021 54730	47 k 0.1W
2704	3198 016 04710	470 pF 50V	2932	3198 016 01010	100 pF 50V	3175	3198 021 51030	10 k 0.1W
2705	3198 017 01030	10 nF 50V	2933	3198 016 01010	100 pF 50V	3176	3198 021 51080	1 Ω
2706	3198 029 31090	10 μF 25V				3300	2120 108 92624	4.7 k 1%
2707	3198 023 21040	100 nF 25V				3302	3198 011 02210	220 Ω 0.17W
2708	3198 023 22240	220 nF 25V				3303	3198 021 51030	10 k 0.1W
2709	2020 552 94914	8.2 pF 50V				3305	3198 021 52240	220 k 0.1W
2710	3198 023 21040	100 nF 25V				3306	2120 108 92624	4.7 k 1%
2712	3198 017 01020	1 nF 50V				3307▲	2322 205 33229	22 Ω FUSE
2713	3198 016 01210	120 pF 50V				3308▲	2120 106 90633	100 Ω
2714	3198 016 02210	220 pF 50V				3309	2322 156 23309	33 Ω 1%
2715	3198 029 52280	2.2 μF 50V				3312	3198 021 51080	1 Ω
2718	3198 017 02230	22 nF 50V				3314	2322 156 21508	1.5 Ω 1%
2719	3198 029 22290	22 μF 16V				3315	3198 012 32230	22 k 3W
2720	2020 021 91527	100 μF 10V				3316▲	2322 205 33229	22 Ω FUSE
2721	3198 023 21040	100 nF 25V				3318▲	2322 207 33102	1 k FUSE NFR25H
2722	3198 016 04710	470 pF 50V				3319	3198 011 04780	4.7 Ω 0.17W
2723	3198 023 21040	100 nF 25V				3320	3198 011 03340	330 k 0.17W
2724	3198 017 01030	10 nF 50V				3321	3198 021 52240	220 k 0.1W
2725	3198 017 21040	100 nF 50V				3324▲	2322 242 13335	3.3 M
2726	3198 029 52280	2.2 μF 50V				3325▲	2322 242 13335	3.3 M
2727	3198 016 01010	100 pF 50V				3326	2120 103 90018	220 Ω
2728	3198 016 01010	100 pF 50V				3327	3198 011 01820	1.8 k 0.17W



3000	3198 021 52220	2.2 k 0.1W
3001	3198 021 51520	1.5 k 0.1W
3002	3198 011 01820	1.8 k 0.17W
3003	3198 021 52220	2.2 k 0.1W
3004	3198 021 51020	1 k 0.1W
3005	3198 021 51020	1 k 0.1W
3006	3198 021 58220	8.2 k 0.1W
3007	3198 021 53920	3.9 k 0.1W
3008	3198 021 52250	2.2 M 0.1W
3009	2120 108 91451	1 k 0.1W
3010	3198 021 51020	1 k 0.1W

3328	2322 156 23309	33 Ω 1%	3621	3198 021 52230	22 k 0.1W	3808	3198 011 03310	330 Ω 0.17W
3329	3198 011 04730	47 k 0.17W	3622	3198 021 51230	12 k 0.1W	3809	3198 011 03310	330 Ω 0.17W
3330	3198 021 54710	470 Ω 0.1W	3623	3198 021 52220	2.2 k 0.1W	3810	3198 011 03310	330 Ω 0.17W
3331	2322 156 21508	1.5 Ω 1%	3624	3198 021 55610	560 Ω 0.1W	3811	3198 011 03310	330 Ω 0.17W
3332	3198 021 54710	470 Ω 0.1W	3625	2120 368 90126	100 k POT	3812	3198 011 08210	820 Ω 0.17W
3334	3198 011 01210	120 Ω 0.17W	3626	3198 021 54730	47 k 0.1W	3813	3198 021 51030	10 k 0.1W
3336	2120 108 92632	33 k 1%	3627	3198 021 58220	8.2 k 0.1W	3814	3198 021 52210	220 Ω 0.1W
3343	3198 021 51040	100 k 0.1W	3629	3198 021 51230	12 k 0.1W	3815	3198 021 53330	33 k 0.1W
3344	3198 021 52230	22 k 0.1W	3630	3198 021 51090	10 Ω 0.1W	3816	3198 011 04710	470 Ω 0.17W
3345	3198 021 54730	47 k 0.1W	3631	3198 021 52290	22 Ω 0.1W	3817	3198 011 04710	470 Ω 0.17W
3347	3198 021 51080	1 Ω	3632	3198 021 51230	12 k 0.1W	3818	3198 021 56820	6.8 k 0.1W
3350	3198 021 51040	100 k 0.1W	3633	3198 021 52220	2.2 k 0.1W	3819	3198 011 01030	10 k 0.17W
3351	3198 021 51030	10 k 0.1W	3634	3198 021 54730	47 k 0.1W	3820	3198 011 04710	470 Ω 0.17W
3352	3198 021 51030	10 k 0.1W	3635	3198 021 53330	33 k 0.1W	3821	3198 011 01010	100 Ω 0.17W
3353	3198 021 54720	4.7 k 0.1W	3636	3198 021 53940	390 k 0.1W	3822	3198 021 54730	47 k 0.1W
3459	3198 021 52210	220 Ω 0.1W	3637	3198 021 51510	150 Ω 0.1W	3823	3198 021 54730	47 k 0.1W
3460	3198 021 51030	10 k 0.1W	3638	2120 109 09158	1.5 Ω	3824	3198 011 01030	10 k 0.17W
3461	3198 021 54710	470 Ω 0.1W	3639	3198 021 54730	47 k 0.1W	3825	3198 011 01010	100 Ω 0.17W
3462	3198 021 54710	470 Ω 0.1W	3640	3198 021 55610	560 Ω 0.1W	3826	3198 021 51030	10 k 0.1W
3463	3198 021 54710	470 Ω 0.1W	3641	3198 021 56810	680 Ω 0.1W	3827	3198 011 01020	1 k 0.17W
3464▲	2322 205 33228	2.2 Ω NFR25	3642	3198 021 52230	22 k 0.1W	3828	3198 021 51030	10 k 0.1W
3465	2306 197 90039	RES OR56 for M63100FP	3644	3198 021 51040	100 k 0.1W	3829	3198 021 51020	1 k 0.1W
3465	2322 193 95074	RST ΩQ47 for M63100AFP	3650	2120 108 92633	39 k 1%	3830	3198 021 52210	220 Ω 0.1W
3466	3198 021 54710	470 Ω 0.1W	3651	3198 011 01010	100 Ω 0.17W	3831	3198 021 52220	2.2 k 0.1W
3467	3198 021 51080	1 Ω	3652	3198 011 01010	100 Ω 0.17W	3832	3198 021 51030	10 k 0.1W
3468	3198 021 58230	82 k 0.1W	3653	3198 021 51020	1 k 0.1W	3833	3198 011 01030	10 k 0.17W
3470	3198 021 52210	220 Ω 0.1W	3654	3198 021 53330	33 k 0.1W	3834	3198 021 54710	470 Ω 0.1W
3471	3198 021 54720	4.7 k 0.1W	3655	3198 021 52720	2.7 k 0.1W	3835	3198 011 08220	8.2 k 0.17W
3472	3198 021 53310	330 Ω 0.1W	3656	3198 021 53330	33 k 0.1W	3836	3198 011 01020	1 k 0.17W
3473	3198 021 55620	5.6 k 0.1W	3657	3198 021 52720	2.7 k 0.1W	3837	3198 011 01030	10 k 0.17W
3474	3198 021 54730	47 k 0.1W	3658	3198 021 54710	470 Ω 0.1W	3838	3198 011 01030	10 k 0.17W
3475	3198 011 01830	18 k 0.17W	3659	3198 021 54750	4.7 M 0.1W	3839	3198 021 51030	10 k 0.1W
3476	3198 011 04740	470 k 0.17W	3660	3198 021 51040	100 k 0.1W	3840	3198 021 51020	1 k 0.1W
3476	3198 011 01040	100 k 0.17W	3661	3198 021 51040	100 k 0.1W	3841	3198 021 51020	1 k 0.1W
3477	2120 101 74274	270 k	3700	3198 021 54710	470 Ω 0.1W	3842	3198 011 08220	8.2 k 0.17W
3478	2120 101 74274	270 k	3701	3198 021 53930	39 k 0.1W	3843	3198 021 51020	1 k 0.1W
3479	3198 021 52250	2.2 M 0.1W	3702	3198 021 51040	100 k 0.1W	3844	3198 011 01030	10 k 0.17W
3480	3198 011 03910	390 Ω 0.17W	3703	3198 021 51830	18 k 0.1W	3845	3198 021 51020	1 k 0.1W
3481	3198 011 03330	33 k 0.17W	3704	3198 021 53330	33 k 0.1W	3846	3198 011 01010	100 Ω 0.17W
3482	3198 011 03330	33 k 0.17W	3705	3198 011 06810	680 Ω 0.17W	3847	3198 021 52220	2.2 k 0.1W
3484	3198 011 01030	10 k 0.17W	3706	3198 021 53310	330 Ω 0.1W	3848	3198 011 01010	100 Ω 0.17W
3485	3198 011 04720	4.7 k 0.17W	3707	2120 368 90124	22 k POT	3849	3198 021 54710	470 Ω 0.1W
3486	3198 011 01030	10 k 0.17W	3708	3198 021 51830	18 k 0.1W	3850	3198 011 01030	10 k 0.17W
3489	3198 011 03910	390 Ω 0.17W	3709	3198 021 51540	150 k 0.1W	3851	3198 011 02220	2.2 k 0.17W
3502	3198 021 56830	68 k 0.1W	3710	3198 021 52210	220 Ω 0.1W	3852	3198 011 02220	2.2 k 0.17W
3503	3198 021 58210	820 Ω 0.1W	3711	3198 021 53320	3.3 k 0.1W	3853	3198 021 54710	470 Ω 0.1W
3504	3198 011 01010	100 Ω 0.17W	3712	3198 021 51020	1 k 0.1W	3854	3198 021 52230	22 k 0.1W
3505	3198 011 01010	100 Ω 0.17W	3714	3198 021 51010	100 Ω 0.1W	3855	3198 021 52220	2.2 k 0.1W
3506	3198 021 58210	820 Ω 0.1W	3715	3198 021 53310	330 Ω 0.1W PAL BG	3856	3198 011 02220	2.2 k 0.17W
3507	3198 021 53320	3.3 k 0.1W	3715	3198 021 52210	220 Ω 0.1W PAL I	3857	3198 021 51030	10 k 0.1W
3508	2120 108 91725	270 k 0.1W	3715	3198 021 52710	270 Ω 0.1W SEC	3858	3198 011 01030	10 k 0.17W
3509	3198 021 53320	3.3 k 0.1W	3716	3198 011 02220	2.2 k 0.17W	3859	3198 021 51020	1 k 0.1W
3510	3198 011 04790	47 Ω 0.17W	3717	3198 021 52720	2.7 k 0.1W	3860	3198 021 54720	4.7 k 0.1W
3512	3198 011 04790	47 Ω 0.17W	3718	3198 021 52220	2.2 k 0.1W	3861	3198 021 54710	470 Ω 0.1W
3521	3198 021 51010	100 Ω 0.1W	3719	3198 021 56820	6.8 k 0.1W	3862	3198 011 04730	47 k 0.17W
3530	3198 021 54720	4.7 k 0.1W	3720	3198 021 54710	470 Ω 0.1W	3863	3198 021 51530	15 k 0.1W
3531	3198 021 51040	100 k 0.1W	3721	3198 021 54720	4.7 k 0.1W	3864	3198 021 54730	47 k 0.1W
3532	3198 021 52230	22 k 0.1W	3722	3198 021 51010	100 Ω 0.1W	3865	3198 021 51830	18 k 0.1W
3533	3198 021 51530	15 k 0.1W	3723	3198 021 51010	100 Ω 0.1W	3866	3198 021 51020	1 k 0.1W
3534	3198 021 54720	4.7 k 0.1W	3724	3198 021 52230	22 k 0.1W	3867	3198 011 01030	10 k 0.17W
3535	3198 021 54720	4.7 k 0.1W	3725	3198 021 54710	470 Ω 0.1W	3868	3198 011 01030	10 k 0.17W
3536	3198 021 52220	2.2 k 0.1W	3726	3198 011 01020	1 k 0.17W	3869	3198 021 51020	1 k 0.1W
3537	3198 021 52220	2.2 k 0.1W	3727	3198 021 55620	5.6 k 0.1W	3870	3198 021 51830	18 k 0.1W
3538	3198 021 54720	4.7 k 0.1W	3728	3198 021 55620	5.6 k 0.1W	3871	3198 021 51030	10 k 0.1W
3539	3198 021 51060	10 M	3729	3198 021 55620	5.6 k 0.1W	3872	3198 021 51020	1 k 0.1W
3540	3198 021 51060	10 M	3730	2120 368 90126	100 k POT	3874	3198 021 51830	18 k 0.1W
3541	3198 021 53330	33 k 0.1W	3731	3198 011 04710	470 Ω 0.17W	3875	3198 021 54720	4.7 k 0.1W
3542	3198 021 53330	33 k 0.1W	3732	3198 021 53310	330 Ω 0.1W	3876	3198 021 54720	4.7 k 0.1W
3543	3198 021 53330	33 k 0.1W	3733	3198 021 52720	2.7 k 0.1W	3878	3198 021 52220	2.2 k 0.1W
3544	3198 021 53330	33 k 0.1W	3734	3198 021 51510	150 Ω 0.1W	3879	3198 021 51030	10 k 0.1W
3545	3198 021 53330	33 k 0.1W	3762	3198 021 55620	5.6 k 0.1W	3880	3198 011 01020	1 k 0.17W
3546	3198 021 53330	33 k 0.1W	3763	3198 021 90020	CHIP jumper	3881	3198 021 51830	18 k 0.1W
3547	3198 021 51030	10 k 0.1W	3764	3198 021 54730	47 k 0.1W	3882	3198 011 01030	10 k 0.17W
3548	3198 021 53940	390 k 0.1W	3765	3198 011 01010	100 Ω 0.17W	3883	3198 021 52230	22 k 0.1W
3549	3198 021 51030	10 k 0.1W	3766	3198 011 01010	100 Ω 0.17W	3885	3198 021 51220	1.2 k 0.1W
3550	3198 021 51030	10 k 0.1W	3767	3198 011 01010	100 Ω 0.17W	3886	3198 011 03920	3.9 k 0.17W
3601	3198 021 54730	47 k 0.1W	3768	3198 021 55620	5.6 k 0.1W	3887	3198 021 52230	22 k 0.1W
3602	3198 011 04730	47 k 0.17W	3769	3198 011 01010	100 Ω 0.17W	3888	3198 021 52230	22 k 0.1W
3603	3198 021 58220	8.2 k 0.1W	3770	3198 021 51020	1 k 0.1W	3889	3198 021 51030	10 k 0.1W
3604	3198 021 58220	8.2 k 0.1W	3771	2120 108 91686	7.5 k	3890	3198 011 01030	10 k 0.17W
3605	3198 021 52250	2.2 M 0.1W	3775	3198 021 54710	470 Ω 0.1W	3891	3198 021 54720	4.7 k 0.1W
3606	3198 021 52730	27 K 0.1W	3776	3198 021 54710	470 Ω 0.1W	3892	3198 021 56830	68 k 0.1W
3607	3198 021 53320	3.3 k 0.1W	3796	3198 021 51020	1 k 0.1W	3893	3198 021 56830	68 k 0.1W
3608	3198 011 01210	120 Ω 0.17W	3797	3198 011 01020	1 k 0.17W	3894	3198 021 56830	68 k 0.1W
3609	3198 011 01210	120 Ω 0.17W	3798	3198 011 01020	1 k 0.17W	3895	3198 021 56830	68 k 0.1W
3610	3198 021 51030	10 k 0.1W	3799	3198 011 01020	1 k 0.17W	3896	3198 021 54720	4.7 k 0.1W
3611	3198 021 53320	3.3 k 0.1W	3800▲	2120 106 90597	10 Ω FUSE	3897	3198 021 54730	47 k 0.1W
3612	3198 021 54750	4.7 M 0.1W	3801	3198 021 52730	27 K 0.1W	3898	3198 021 51520	1.5 k 0.1W
3613	3198 021 53390	33 Ω 0.1W	3802	3198 011 04780	4.7 Ω 0.17W	3899	3198 011 01030	10 k 0.17W
3614	3198 021 51830	18 k 0.1W	3803	3198 021 52220	2.2 k 0.1W	3901	3198 021 51030	10 k 0.1W
3615	3198 021 52240	220 k 0.1W	3804	3198 021 55630	56 k 0.1W	3901	3198 021 52220	2.2 k 0.1W
3616	3198 021 54720	4.7 k 0.1W	3805▲	2120 106 90597	10 Ω FUSE	3902	3198 021 57590	75 Ω 0.1W
3617	3198 021 54720	4.7 k 0.1W	3806	3198 021 54730	47 k 0.1W	3903	2122 551 00008	VDR MAX 21V
3619	3198 021 51030	10 k 0.1W	3807	3198 021 51040	100 k 0.1W	3904	2122 551 00008	VDR MAX 21V

3905	2122 551 00008	VDR MAX 21V
3906	2122 551 00008	VDR MAX 21V
3907	2122 551 00008	VDR MAX 21V
3908	2122 551 00008	VDR MAX 21V
3909	2122 551 00008	VDR MAX 21V
3910	3198 021 51040	100 k 0.1W
3911	3198 021 51040	100 k 0.1W
3912	3198 021 57590	75 Ω 0.1W
3913	3198 021 57590	75 Ω 0.1W
3914	3198 021 56820	6.8 k 0.1W
3915	2122 551 00008	VDR MAX 21V
3916	3198 021 56820	6.8 k 0.1W
3917	3198 021 54720	4.7 k 0.1W
3918	3198 021 56820	6.8 k 0.1W
3919	3198 021 51040	100 k 0.1W
3920	3198 011 06820	6.8 k 0.17W
3921	3198 021 57590	75 Ω 0.1W
3922	3198 011 02210	220 Ω 0.17W
3923	3198 021 52210	220 Ω 0.1W
3924	3198 011 02210	220 Ω 0.17W
3925	3198 021 52210	220 Ω 0.1W
3926	3198 021 51040	100 k 0.1W
3927	3198 021 54720	4.7 k 0.1W
3928	3198 021 54710	470 Ω 0.1W
3929	3198 021 57590	75 Ω 0.1W
3930	3198 021 52210	220 Ω 0.1W
3931	3198 021 52210	220 Ω 0.1W
3932	3198 021 52210	220 Ω 0.1W
3933	3198 021 52210	220 Ω 0.1W
3934	3198 021 54710	470 Ω 0.1W
3935	3198 021 54790	47 Ω 0.1W
3936	3198 021 51030	10 k 0.1W
3937	3198 021 54790	47 Ω 0.1W
3938	3198 021 51020	1 k 0.1W
3939	3198 011 08210	820 Ω 0.17W
3940	3198 021 52210	220 Ω 0.1W
3941	3198 021 52210	220 Ω 0.1W
3942	3198 021 53910	390 Ω 0.1W
3943	3198 021 51030	10 k 0.1W
3944	3198 021 56830	68 k 0.1W
3945	3198 021 56820	6.8 k 0.1W
3946	3198 021 54720	4.7 k 0.1W
3947	3198 021 54790	47 Ω 0.1W
3948	3198 021 51010	100 Ω 0.1W
3949	3198 011 01010	100 Ω 0.17W
3952	3198 021 54720	4.7 k 0.1W
3953	3198 011 01040	100 k 0.17W
3954	3198 021 51040	100 k 0.1W
3955	3198 021 51040	100 k 0.1W
3956	3198 021 51040	100 k 0.1W
3957	2122 551 00008	VDR MAX 21V
3958	2122 551 00008	VDR MAX 21V
3959	2122 551 00008	VDR MAX 21V
3960	2122 551 00008	VDR MAX 21V
3961	3198 021 51510	150 Ω 0.1W
3961	3198 021 51080	1 Ω for frontchinch sub
3962	3198 011 06820	6.8 k 0.17W
3963	3198 021 51010	100 Ω 0.1W
3964	3198 021 51010	100 Ω 0.1W
3965	3198 021 51010	100 Ω 0.1W
3966	3198 011 06820	6.8 k 0.17W
3967	3198 021 51010	100 Ω 0.1W

5000	2422 535 97877	10 μH
5001	2422 535 97877	10 μH
5002	2422 535 97877	10 μH
5003	2422 535 97877	10 μH
5004	3198 018 15690	56 μH
5006	3198 018 11010	100 μH
5007	2422 535 94885	470 μH
5071	3198 018 16880	6.8 μH
5072	2422 535 97877	10 μH
5073	3198 018 15690	56 μH
5074	3198 018 12290	22 μH
5075	3198 018 12790	27 μH
5170	2422 535 97877	10 μH
5300	3198 018 90020	BEAD 100mH z
5301▲	3128 138 39060	MAINS TRANSFORMER
5302	3198 018 21090	10 μH
5304	2422 535 94639	10 μH
5305	2422 549 44287	MAINS TER
5306	2422 535 94674	330 nH
5307	3198 018 90080	COIL
5308	3198 018 90080	COIL
5460	2422 535 94674	330 nH
5500	3198 018 11090	10 μH
5501	3198 018 11090	10 μH
5502	3198 018 11090	10 μH
5600	3103 138 24910	COIL ASSY
5605	3198 018 90080	COIL
5610	2422 535 97877	10 μH at pos of 9412

5650	3198 018 26880	6.8μH
5651	3198 018 12290	22 μH
5701	3198 018 11590	15 μH
5702	2422 549 44162	COIL VAR
5703	3198 018 90080	COIL
5704	2422 549 44162	COIL VAR
5706	3198 018 16880	6.8 μH
5707	2422 535 97875	6.8 μH
5708	3198 018 11090	10 μH
5709	3198 018 90090	COIL
5710	3198 018 13990	39 μH
5760	3198 018 21090	10 μH
5761	3198 018 21010	COIL
5762	3198 018 21090	10 μH
5763	3198 018 90080	COIL
5901	2422 535 97877	10 μH
5904	2422 535 94306	COIL
5905	3198 018 90080	COIL
5906	3198 018 90080	COIL

6170	9322 154 48667	IR TSOP2236 with holder
6170	9322 155 82667	IR TSOP2236 without holder
6171	9336 247 60133	BAT85
6300	9337 234 20133	BYD33J
6301	9322 103 46673	SBYV27-200
6302	9322 126 71673	BYT42M
6304	9334 515 80673	1N4003
6305	9334 515 80673	1N4003
6306	9337 234 00133	BYD33D
6307	3198 010 10070	BAV21
6308	9337 234 00133	BYD33D
6309	9322 128 68682	SB360
6310	9338 386 60673	1N4006GP
6311	9338 386 60673	1N4006GP
6312	9338 386 60673	1N4006GP
6313	9338 386 60673	1N4006GP
6315	3198 010 54780	BZX79-B4V7
6316	3198 010 53980	BZX79-B3V9
6317	9340 255 30115	BAS216
6317	9322 128 15685	MCL4148 TEGO optional
6460	3103 138 87290	Kit: 2x Sens. + 1x LED
6601	9322 145 52685	BZM55-B7V5 R
6602	9340 387 00115	BZX284-C12
6602	9322 129 41685	BZM55C12 TEGO optional
6702	9340 255 20115	BA792
6760	3198 010 10010	1N4148
6761	9340 255 30115	BAS216
6761	9322 128 15685	MCL4148 TEGO optional
6801	9336 247 60133	BAT85
6802	9340 386 40115	BZX284-C6V8
6803	9340 386 40115	BZX284-C6V8
6804	3198 010 10010	1N4148
6805	3198 010 10010	1N4148
6901	9340 386 40115	BZX284-C6V8
6902	9322 032 16673	MTZJ12C
6903	9322 032 16673	MTZJ12C
6904	9340 387 00115	BZX284-C12
6904	9322 129 41685	BZM55C12 TEGO optional
6905	9340 386 40115	BZX284-C6V8
6906	9340 386 40115	BZX284-C6V8
6907	9340 387 00115	BZX284-C12
6907	9322 129 41685	BZM55C12 TEGO optional
6908	9340 386 40115	BZX284-C6V8
6909	9340 387 00115	BZX284-C12
6910	9322 129 41685	BZM55C12 TEGO optional
6910	9340 387 00115	BZX284-C12
6910	9322 129 41685	BZM55C12 TEGO optional
6911	9340 386 40115	BZX284-C6V8
6912	9340 386 40115	BZX284-C6V8
6913	9340 387 00115	BZX284-C12
6913	9322 129 41685	BZM55C12 TEGO



7002	9330 921 11215	BFS20
7003	9330 921 11215	BFS20
7004	8203 107 03040	LA71595M (SUPER YCA)
7005	3198 010 42310	BC847BW
7006	3198 010 42320	BC857BW
7008	3198 010 42310	BC847BW
7009	3198 010 44220	DTA124EU
7010	3198 010 42310	BC847BW
7071	3198 010 42320	BC857BW
7072	9322 147 59682	LA7339A
7073	3198 010 42310	BC847BW
7075	3198 010 42310	BC847BW
7077	3198 010 42310	BC847BW
7170	2722 171 07186	DISPLAY
7172	3198 010 44320	DTC124EU

7300▲	9322 127 19682	OPT CP TCET1101G
7301	9322 086 97676	TL431ACZ-AP S
7302	9322 136 93687	FET 25K2750
7303	9322 136 56682	MC44608P40 L
7306	9322 147 95668	FET 25K2839
7307	3198 010 44320	DTC124EU
7308	3198 020 43430	BC327-25
7309	3198 010 42310	BC847BW
7310	3198 010 44320	DTC124EU
7315	3198 010 42310	BC847BW
7316	3198 010 42320	BC857BW
7350	3198 020 43530	BC337-25
7351	3198 010 42320	BC857BW
7461	3103 138 87290	Kit: 2x Sens. + 1x LED
7462	3103 138 87290	Kit: 2x Sens. + 1x LED
7463	9322 054 99668	M63100FP
7464	9322 097 89682	OPT CP TCRT5000L
7465	9322 097 89682	OPT CP TCRT5000L
7466	9322 097 91682	OPT CP TCST1030L
7501	3198 010 42320	BC857BW
7502	9322 136 21668	SDA5652-2X
7530	9339 476 70668	LM339DT
7531	3198 010 42310	BC847BW
7532	3198 010 42310	BC847BW
7601	3198 010 42310	BC847BW
7602	9335 897 30215	BC856B
7603	9331 795 40126	BC327-40
7604	9335 895 60215	BC846B
7606	3198 010 42310	BC847BW
7607	9335 895 60215	BC846B
7608	3198 010 43240	BC817-40
7650	9352 615 79557	TDA9605H
7701	9333 729 60653	HEF4053BT
7702	3198 010 44320	DTC124EU
7703	3198 010 42310	BC847BW
7704	3198 010 42320	BC857BW
7705	9352 621 13118	TDA9817T/V1 R
7705	9352 606 11118	TDA9818T/V1 R
7706	3198 010 42310	BC847BW
7760	9352 640 81557	TDA9873HZ
7761	9322 147 97668	MSP3415D-QG-B3
7800	3198 010 42310	BC847BW
7801	3198 010 42310	BC847BW
7802	3198 010 42310	BC847BW
7803	3198 010 42320	BC857BW
7804	3198 020 43530	BC337-25
7807	3198 010 42310	BC847BW
7808	3198 010 42310	BC847BW
7809	3198 010 44220	DTA124EU
7811	3198 010 42310	BC847BW
7812	9331 795 40126	BC327-40
7818	9322 120 64668	M24C08-MN6
7899	3103 165 13320	TMP93CW76F-ACAP1-xU
7899	3103 165 13330	TMP93CW76F-ACAP2-xU
7899	3103 165 13340	TMP93CW76F-ACAP3-xU
7899	3103 165 13350	TMP93CW76F-ACAP4-xU
7899	3103 165 13360	TMP93CW76F-ACAP5-xU
7899	3103 165 13370	TMP93CW76F-ACAP6-xU
7899	3103 165 13380	TMP93CW76F-ACAB1-xU
7904	9322 124 28682	STV6401
7905	3198 010 42040	BC847C
7906	3198 010 42040	BC847C
7907	3198 010 42310	BC847BW
7908	3198 010 42310	BC847BW
7909	3198 010 42320	BC857BW
7910	3198 010 42310	BC847BW
7911	9333 729 60653	HEF4053BT
7912	3198 010 42310	BC847BW
7913	3198 010 43240	BC817-40
7914	3198 010 42310	BC847BW
7917	3198 010 42040	BC847C
9759	3198 021 90020	CHIP JUMPER

